A STRATEGIC ANALYSIS OF THE BRITISH COLUMBIA PANEL BOARD INDUSTRY

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REPORT SUMMARY

Introduction

The B.C. structural panelboard industry has been undergoing considerable change and rationalization in recent years. The once dominant plywood industry in B.C. has suffered from a decline while there has been significant expansion across North America in the production of structural reconstituted boards. These changes have complicated the outlook for development prospects in the B.C. panelboard industry. The Federal and Provincial governments need to formulate program policy and to anticipate adjustment pressures over the medium and long term.

The Management Committee of the Canada-British Columbia Industrial Development Subsidiary Agreement commissioned Woodbridge, Reed and Associates (a division of H.A. Simons) to undertake a study of this industry sector.

The objective of the study was to evaluate the outlook for the B.C. panelboard industry - specifically plywood and waferboard/OSB (oriented strand board) - and to assess the development opportunities available. The analysis was to include an estimate of the most probable scenario for the next ten years without government intervention and to identify areas where government activity could have positive impact.

The approach taken was both qualitative and quantitative. The Canadian domestic market in particular was analyzed in some depth to identify consumer trends, preferences and reasons for utilizing different types of boards. In addition, an econometric model approach was used to generate the overall outlook for the use of structural panels.

Panelboard Markets and Trade Flows

The uses of structural panels are many and varied. Consequently, the needs of the consumers vary widely; some are very stringent and can only be satisfied by certain types of panel while for others, cost is the major factor. Thus, for example, though waferboard/OSB can displace sheathing plywood in many residential uses, for concrete form work plywood is still required.

The trade flows of structural panels in North America are relatively complicated:

- very little plywood moves across the U.S./Canada border due to high tariffs;
- waferboard/OSB is exported from Canada to the U.S. but the majority of U.S. produced product is consumed in the region of origin;
- almost all plywood consumed in Canada is produced in the West;
- U.S. plywood is produced in the South and West but is consumed throughout the country.

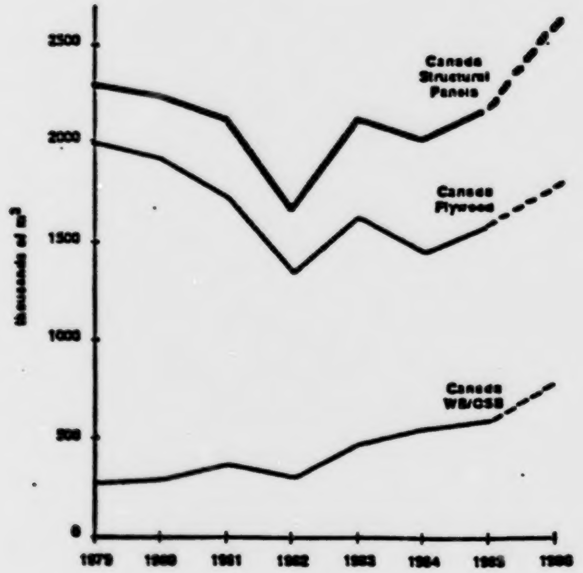
Though the market is evidently not homogeneous there is considerable inter-regional product flow.

Within Canada, the plywood production has historically been distributed to five major market areas - B.C., the Prairies, Ontario, Quebec/Atlantic and export. Generally each area has taken around 20 per cent of production.

Changes have occurred in plywood markets due to competition between sheathing plywood and waferboard/OSB for uses in residential construction. In Eastern Canada, the market share of plywood dropped from 80 per cent in 1980 to below 65 per cent in 1986. The major part of the decline occurred in the early 1980's. In Western Canada, plywood still has a higher market share but the new western OSB plants will likely reduce this share further in the next two years. The historical situation for Canada in total is shown in Figure 1. When consumption declined radically in the early 1980's, it was plywood that suffered most. With the return to more normal consumption levels, plywood shipments have shown some increase while waferboard/OSB has continued to gain market share. Though not shown in Figure 1, it is worth noting that shipments of sanded plywood remained relatively static throughout the period.

Figure 1

Structural Panel Consumption



A field survey was undertaken in Ontario and Quebec since consumers in these markets have had waferboard available to them for many years. It was found that in Ontario, for example, the wholesale price for 3/8" plywood was 35/40 per cent over that of 7/16" waferboard and for 5/8" thickness, the differential was up to 50/60 per cent. Yet the statistical evidence shows that plywood is still in demand.

A number of reasons were found for this apparent inconsistency. The most important is that there are many uses where the consumer still prefers plywood despite its higher price.

The field survey results, supported by subsequent discussions with industry, indicate that the consumption sectors of easy penetration by waferboard in Central Canada have been captured. Consumer attitudes, together with specific needs, are making further penetration increasingly difficult.

Export markets play a significant role. Over half of the waferboard/OSB produced in Canada is exported to the U.S. and about 20 per cent of plywood is shipped offshore. The principal offshore markets are the EEC countries which account for about 90 per cent of plywood exports. The principal competition in these markets has been U.S. plywood mills who have a 50 per cent market share.

The Japanese market, though one of the world's largest for plywood, has so far proved difficult for North American exports of coniferous plywood to penetrate. Traditional consumer attitudes about quality, sizes and specifications have proved difficult to overcome.

Supply/Demand Outlook for North America

In order to develop an overall estimate of the demand outlook for structural panelboards, the services of Resource Information Systems Inc. (RISI) were utilized as part of the project study. RISI provided projections, based on detailed econometric models, of the likely demand scenario for North America.

Economic Projections

The need for structural panels is a function of activity in the four principal consuming sectors

- residential construction;
- non residential construction;
- repairs and alterations;
- industrial production.

These sectors, in turn, are influenced by macro economic factors such as interest rates, demographics, GNP growth and so on. RISI draws upon Data Resources Inc. (DRI) for data on these factors.

In overall terms, DRI foresees modest growth in the U.S. economy and slightly better in Canada for the 1986-2000 period. U.S. housing starts, which are expected to decline to an average of only 1.4 million in the 1990's, are the exception. The Canadian dollar is projected to strengthen slowly to Cdn.$1.2/$1 U.S. by the late 1990's.

Demand Outlook

The projections for the consumption of structural panels in North America are as follows:

North American Structural Panel Demand million m^3

	Canada	U.S.	Total
1981/85	2.1	17.4	19.5
1986/90	2.6	22.5	25.1
1991/95	2.8	23.3	26.1
1996/2000	3.1	25.1	28.2

These figures indicate that growth in structural panel demand is likely to occur in both Canada and the U.S. up to the year 2000. It should be noted that, within these average levels, there are significant annual fluctuations.

The demand for offshore exports is projected by RISI to continue at a relatively stable level of between 700/850,000 m^3 over the period.

The overall environment within which to analyze the probable scenario for the B.C. panelboard industry is therefore comparatively favourable.

New Supply Outlook

While demand for structural panelboard is increasing, considerable new supply capacity is already being installed. This new capacity is virtually all in waferboard/OSB (1.6 million m^3 over current volumes). In addition, the modernization of plywood facilities has and will continue to offset the closure of less economic plants.

The physical availability of suitable resources is not a restricting factor in the development of new supply of structural boards. Waferboard/OSB can utilize almost any available timber and the latest production technologies allow plywood to be made from a much broader spectrum of the resource. New supply of structural boards will therefore depend principally on economic fibre availability, market location and production costs.

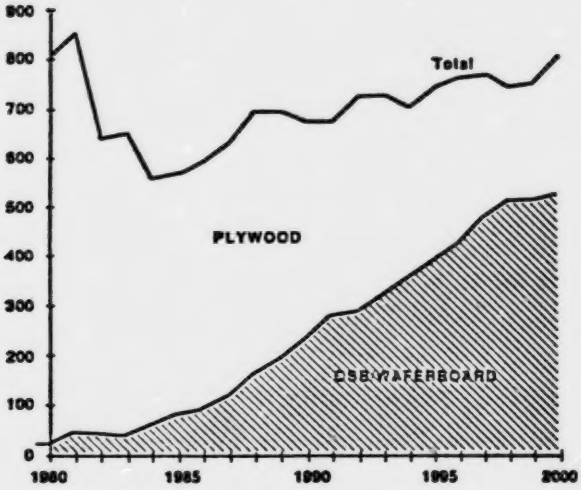
Supply/Demand Outlook for B.C./Alberta

Control Projection

Based on the overall North American supply/demand outlook, RISI undertook a specific projection of the likely situation in the B.C./Alberta region. The calculation of how overall demand is satisfied by the alternative products is driven mainly by production costs but tempered by consumer acceptance factors. The result of this approach is shown in Figures 2 and 3. In addition, considerable volumes of waferboard/OSB are projected to be shipped to the U.S. West rising to 400,000 m^3 in 1990 and 565,000 m^3 in 1995.

Figure 2

B.C./ALBERTA STRUCTURAL BOARD DEMAND

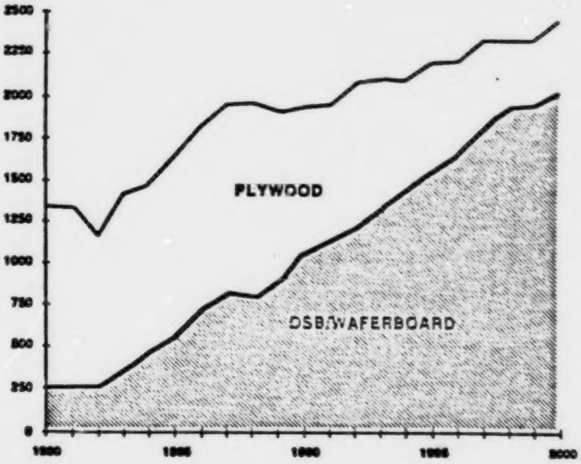


SOURCE: RISI control forecast

Figure 3

CANADIAN STRUCTURAL BOARD DEMAND EAST OF ALBERTA

Thousand m^3



SOURCE: RISI control forecast

It is evident from these figures that the outlook indicated under this control projection is for a substantial decline in plywood with a reduction in shipments of 600,000 m^3 from current levels by 1995 (i.e. a decrease of over one third). Furthermore, the volume of waferboard/OSB shipments projected are such that current and planned mills in B.C./Alberta will not reach 90 per cent capacity utilization until the early 1990's.

An outlook of this nature would have a very severe impact on the B.C. industry and needs further analysis to consider the sensitivity of some basic assumptions and to examine the effect of taking a more judgemental approach.

Sensitivity Analysis

It is known that many mills in B.C. still have high production costs since they are not utilizing the latest technologies. A low cost simulation was run on the model based on the assumption that production costs for plywood could be reduced by 10 per cent by 1991. The impact of this change is very significant. Plywood shipments remain relatively stable up to the early 1990's but decline in later years. By 1995, the reduction in demand from current levels is 250,000 m^3 as opposed to 600,000 m^3 as projected in the control forecast.

An important assumption has been the exchange rate relative to the U.S. A simulation based on the assumption that the Canadian dollar would strengthen to $0.90/U.S.$ by 1991 was run. This approach has a major impact on the sales of waferboard/OSB to the U.S. West. The results indicate that B.C./Alberta mills would be largely uncompetitive and would achieve much lower export sales levels. Even current and planned capacity would not be utilized, eliminating the opportunity to build new plants.

The control projection also assumes a continuation in the current high tariff barriers between U.S. and Canada and thus virtually no movement of plywood across the border. A simulation was run assuming the tariffs are reduced to zero. The impact of this change was minimal. Net trade remained very low with imports of sanded plywood into Canada being balanced by sheathing exports to the U.S. A second approach was taken whereby, in addition to reducing tariffs to zero, it was assumed that the value of the Canadian dollar would remain at current levels instead of strengthening (as in the control projection). The result of this simulation was that Canada exported increasing volumes of sheathing to the U.S.

Judgemental Analysis

The econometric approach to the development of forecasts is a generally accepted method but in this instance it may have some limitations. The particular problem can be that too great an emphasis is placed on comparative production costs and too little on consumer attitudes and specific needs for the many and varied uses. Because it is difficult to assess the effect of these factors mathematically, a more judgemental approach was taken.

This approach was based on the following assumptions:

- Sanded and specialty plywood demand in Canada has been stable and the RISI forecasts for these grades in the U.S. also indicate that there will be a continued demand throughout the period under study. It is assumed that this forecast should also apply in Canada.

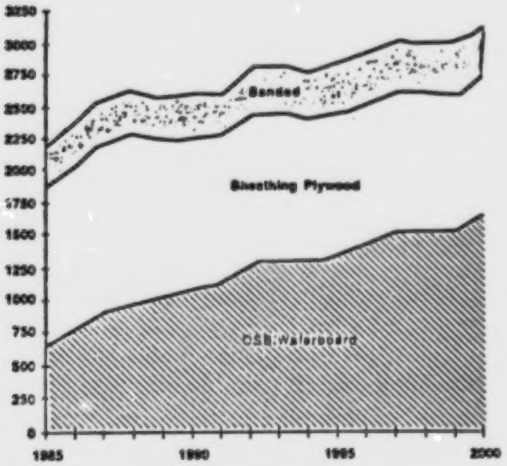
- The rate of penetration by waferboard/OSB has slowed in Central Canada. It is assumed that this rate will continue to decline. It is also assumed that B.C./Alberta will follow a similar trend to that evident in Central Canada.

The result of this approach is shown in Figure 4. The demand for plywood remains relatively static around current levels.

Figure 4

CANADIAN STRUCTURAL BOARD
DEMAND - JUDGEMENTAL APPROACH

Thousand m^3



SOURCE: Appendix Table 6

In endeavouring to choose between the various different projections in order to assess which is the "most probable scenario" a number of points need evaluation:

- What changes in plywood production cost can be achieved through modernization?
- How likely is the industry to make the investment necessary to modernize?
- What is the likely development of specialty plywood or other specialty products?
- What are the prospects for tariff changes?
- How far can waferboard/OSB penetrate into the markets in Canada and U.S. West?

Lower Production Costs

The potential for and impact of new technology is one of the most important of these questions. The level of utilization of the latest technology is very different in the two industry sectors. The majority of waferboard/OSB plants (apart from some in Central Canada) are new and already incorporate most of the latest technology. In contrast, many B.C.

plywood mills are relatively old and the great majority have the opportunity to modernize by investing in new technologies that have been developed in recent years. Some of these technologies are:

- spindleless lathes and other lathe improvements that allow a radical improvement in veneer recovery from smaller diameter logs;
- rotary clippers;
- dry veneer stackers;
- foamed glue applications;
- automated veneer lay up.

At present, the average production cost for the manufacture of sheathing plywood in B.C. is close to \$200/m^3 (excluding depreciation etc.). This contrasts with a production cost of around \$115/m^3 for waferboard/OSB. With such a radical difference, it is not surprising that the forest industry has believed that the outlook for sheathing plywood is very poor even though plywood sells at a substantial premium.

It is estimated, however, that a modern mill, utilizing all the latest technology, can lower production costs down to \$140/m^3 - a reduction of 30 per cent. In the low cost simulation referred to earlier, it was shown that even with a reduction of 10 per cent, the outlook for the plywood industry was substantially improved.

These lower costs are only possible if the necessary investment is made. To modernize the B.C. industry to this level would probably require an investment of around \$100 million. Each of the new improvements mentioned above show favourable returns on investment with short payback periods. Until very recently, however, corporate management has been reluctant to commit the necessary capital.

A principal reason for this reluctance had been a lack of confidence in the plywood industry. Other demands on scarce capital resources were given higher priority.

During the past year, however, plywood mills have been showing profits and the attitude to the plywood industry, at a corporate level, is changing. Several companies have committed to capital expenditures and equipment suppliers advise that there has been a substantial increase in the level of enquiries for state-of-the-art equipment.

The plywood industry has undergone a major structural change, resulting from the introduction of a competitive product. Less competitive operations have closed or rationalized their product mix. The survivors are now encouraged by improved profitability and a cyclical upswing in demand after the low volumes prevalent in the early 1980's. The economics of modernization are proven and it is believed that the investment will be made.

Specialty Products

The future development of the plywood sector lies not only in its ability to compete in commodity products, but also in its ability to market products better suited to consumer needs. These products can result from relatively minor changes in lay up or thicknesses or from overlays on a plywood substrate. Alternatively new manufacturing techniques such as LVL (laminated veneer lumber) can be incorporated into the industry.

The coastal industry has already moved to reduce or eliminate regular sheathing plywood production and emphasize the production of sanded and overlaid specialties. There is a need for more effort in this area as OSB penetrates further into the flooring market for select sheathing. Coastal log costs are very high and it is essential that product lines are developed to capitalize on the quality of product that can be produced from coastal species. Yet the research and development effort required to identify market niches - many of which are small - and to design the necessary product is substantial.

The past record of the forest industry suggests that few companies are prepared to commit to this effort. Consequently, in the absence of any specific impetus or breakthrough it is believed unlikely that there will be any dramatic increase in the production of specialty plywoods.

Conceptually, the outlook for LVL is very promising. Utilization of new plywood technology could result in the production of LVL at around $150/m^3. Apart from the development of specialty use markets, the new technology would allow LVL producers to compete directly with long length wide width lumber. Furthermore, the addition of an LVL line to an existing plywood plant is possible at a cost of around $10 million, whereas a greenfield LVL plant would cost approximately $30/35 million.

At present, no B.C. mills are known to be actively considering the installation of LVL facilities and the product is not generally known in the market. Nevertheless, it is believed that by the early 1990's LVL facilities will be in place. They are not, however, likely to have any dramatic impact on the plywood industry in the foreseeable future.

Tariffs

In the past, the impact of tariffs on offshore plywood exports from B.C. has been relatively limited. In the future, however, with the opportunity of greater availability resulting from increased competition in the domestic market, restrictions in trade caused by tariffs could be more significant. The current EEC duty free quota system has resulted in significant market disruptions. It is hoped that there will be some tariff reductions and a rationalization in the system in the course of the next GATT round.

The tariffs between U.S. and Canada are currently so high that very little plywood moves either way. The development of a performance standard in Canada should develop the necessary framework whereby the products of the U.S. or Canadian industries are acceptable in either country. It is believed, therefore, that there should be substantial tariff reductions, after the next GATT round, to apply in the early/mid 1990's.

Waferboard/OSB

The opportunity for growth in OSB appears encouraging. The level of penetration in the U.S. West is well below that evident in other areas of the U.S. Even assuming that plywood would be a stronger competitor in the West, significant increases can be expected. Whether this demand would be satisfied by additional capacity in the U.S. or Canada (mainly B.C. or Alberta) is a function of resource availability and economics (wood, manufacturing and transportation costs). The resource is available at a variety of locations in B.C. but the economic criteria that define where a company will invest are complicated and can be significantly influenced by government incentive packages.

Though OSB competes directly with sheathing plywood, it is not believed that additional expansion in OSB capacity in B.C. will have a significant impact on the sales of plywood by B.C. producers because there is an upper limit to the penetration of OSB into the market and it has been assumed that this limit will have been reached. The existing and planned OSB capacity in the area is already far in excess of what can be sold in Canada.

Consequently, though new producers will no doubt sell into the domestic market, these sales will principally be at the expense of other OSB manufacturers. Additional penetration into export markets will be essential.

A major concern for new, and indeed existing, OSB producers must be the exchange rate. Any substantial strengthening in the Canadian dollar would have a drastic effect on the relative economics and would encourage the development of more OSB facilities in the U.S. West. The danger of protectionist duties also exists.

Most Probable Scenario

The 'most probable' scenario for production by the B.C./Alberta panel industry, developed as a result of the RISI projections and the subsequent analyses of the various important elements, is shown in Figure 5.

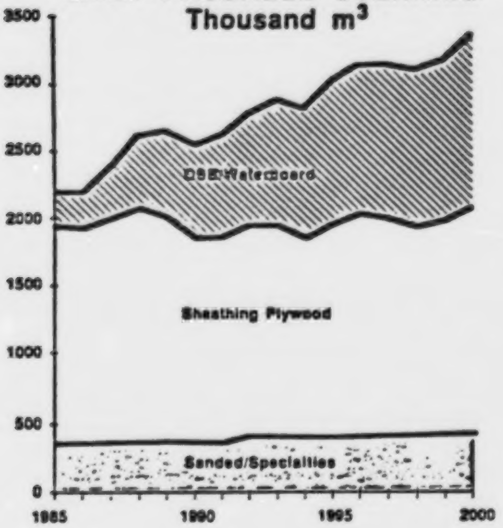
A full list of the assumptions made is provided in the body of the report but the most important are:

- the B.C. plywood industry will invest in modernization;
- there will continue to be a demand for sheathing plywood in Canada;
- the penetration of OSB into the U.S. West can be substantially greater than projected by RISI.

The implications of this scenario to plywood is that the industry is emerging, from a period of considerable change, with the potential to continue as an economically viable sector of the forest industry.

Figure 5

MOST PROBABLE SCENARIO
Thousand m^3



The regional impact on the B.C. panel industry is shown in the following table.

The Outlook for the B.C. Panel Industry

	1986		1990		1995		2000	
	Coast	Interior	Coast	Interior	Coast	Interior	Coast	Interior
Number of mills								
plywood	7	13	6	13	6	11	6	11
OSB	-	-	-	1	-	2	-	3
Employment								
plywood	1,750	2,450	1,600	2,250	1,550	2,200	1,500	2,150
OSB	-	-	-	100	-	200	-	300
Production volume (000 m^3)								
plywood	650	1,080	550	1,120	600	1,160	570	1,280
OSB	-	-	-	190	-	375	-	600
Capacity utilization								
plywood	78%	95%	75%	90%	85%	85%	80%	90%
OSB	-	-	-	90%	-	85%	-	90%

It is projected that on the Coast, after some further reduction in the near future, a relatively stable situation should exist both in production and employment levels. In the Interior, however, it is expected that modernization will have a significant impact on output per man hour and the number of mills required to satisfy demand.

Activity over the period is not expected to be constrained by a lack of raw material. In the Interior, the new technologies permit the use of a broader spectrum of the resource. On the Coast, there will continue to be sufficient high quality raw material to sustain the current, relatively low, level of activity.

The "most probable" outlook was developed on the assumption that there would be no specific government intervention, except in the case of OSB. At the same time, since there is an ongoing interaction between government and industry, there must be the presumption that government is actively supporting industry. In addition, however, there are specific actions possible on the part of government which can reinforce the likelihood of this scenario occurring and improve the outlook.

Potential Government Initiatives

There are a variety of government initiatives that can be adopted to maintain and promote the type of industrial development that is essential to the economic health of the region. Each of these initiatives requires assessment in terms of cost and potential benefit to the province.

- **Modernization.** It has been emphasized throughout this report that modernization is critical to the maintenance of a healthy plywood industry. On the basis of current developments, it has been projected that the necessary investment will be forthcoming. Clearly government initiatives such as tax incentives, low interest loans, training grants and so on will help to promote this investment.

  Unless approximately $100 million are invested in modernization, the outlook is for a substantial decline in plywood output by 1995. This decline would be equivalent to a loss in sales revenue of about $120 million annually and close to 1000 jobs in the mills alone.

- **Financial Packages for New Development.** A wide variety of incentive packages are being offered by all levels of government worldwide. In the forest industry, it is no longer sufficient simply to offer the availability of a resource. B.C. has few intrinsic advantages over other regions in the West and must compete fiercely with other jurisdictions to attract new OSB plants. It is therefore highly probable that, if the potential demand for OSB is to be satisfied from facilities in B.C., financial incentive packages will be necessary.

  The benefit to be gained from the establishment of a $45 million facility manufacturing 200,000 m^3 of OSB annually is equivalent to a sales revenue of around $30 million. The direct employment generated would be about 100 jobs in the mill and a further 40/50 full time jobs in the woodlands.

- **Restructuring Existing Companies.** Governments in the U.S. and Canada have been involved in restructuring companies that are in danger of closing. Examples are Anacortes Plywood in Washington and Victoria Plywood in B.C. The cost/benefit relationship of this approach is very site specific. In the consultant's view, such intervention can only be justified if an economically viable operation (with no need for continued support) can be created. Even then, the impact on the industry sector as a whole must be analyzed in detail.

- **Tariffs.** The potential for export of panel products is constrained by tariff and non-tariff barriers. The cost to government of pressing for reductions in these barriers is very low compared with the gains to be obtained from increased exports. Clear directives from industry on what is needed (not only the first choice but desirable fall-back positions) are essential.

- **Promotion.** A study undertaken for the Federal Government in 1985 demonstrated a strong relationship between promotion and volumes exported. An expansion of promotional effort to include specialty products and OSB is likely to result in increased exports.

- **Research and Development.** A major constraint to the development of specialty products is the high cost of R&D. Government support in funding technical and market R&D and coordinating the efforts of individual companies can be very effective. There is good potential for specialty products of high value and current volumes of these products could probably be doubled. This increase would represent an increase in sales value for plywood of over $20 million per year and, given the higher labour content of specialty products, up to 150 jobs. The R&D cost to achieve this expansion would probably be in the region of $1 million.

Recommended Government Strategy

The consultants were requested to make some recommendations to government for the initiatives described above. The following recommendations are based only on an objective analysis of the problems and opportunities that have been identified for the B.C. panel industry, without consideration of overall regional industrial development policies and in the absence of sophisticated cost-benefit analysis.

Major Programs

I The government should take an active role in the promotion and encouragement of investment in the modernization of the B.C. plywood industry. The immediate action should be discussions with industry on the conclusions of this report in order to obtain an agreement on a framework for development.

II The government should prepare detailed analyses of the extent of the financial incentive that can be offered in order to attract investment in OSB facilities to B.C.

III The consultants share industry's negative views regarding the benefits of restructuring packages to rescue failing industries. Therefore, only in very specific circumstances should government interfere with the free market forces that have resulted in the failure of a particular operation.

Traditional Programs

The role of government in the areas of tariff, promotion and R&D is very important and further support should be provided by government in these areas. Specific actions and appropriate joint funding by industry need to be established once general agreement is reached on the framework for development.

1

INTRODUCTION

The B.C. panelboard industry has been undergoing considerable change and rationalization in the recent past. Plants have been closed, product lines have been changed and new facilities producing competitive products are being built. The provincial and federal governments require some clear understanding of the industry and its outlook in order to establish government policy for industrial development in this sector.

The Federal/Provincial Management Committee for the Industrial Development Agreement therefore commissioned Woodbridge, Reed and Associates (a division of H.A. Simons Ltd.) to undertake a study on the B.C. panelboard industry.

The objectives of the study were:

1. To identify and describe the most probable scenario for the performance of the B.C. panelboard industry (plywood and waferboard/OSB) over the next 10 years (without further government intervention).
2. To assess the alternative opportunities available to the plywood sector to stabilize and/or expand market penetration and to assess the opportunity for further development of the OSB/waferboard sector in B.C.
3. To recommend a strategic plan for the wood based panel sector and evaluate the need for government initiatives.

The study was carried out during the period May-August 1986.

The most critical questions to be answered were:

- what is the overall outlook for the use of products in the general category of structural boards?
- what are the effects of new technology on the production of the different types of structural boards?
- what are the uses for the boards and what are the patterns of consumer acceptance?
- which types of structural boards are likely to be required and how does this affect supply from B.C.?
- what impact can government have?

The initial approach involved updating the information available from a variety of earlier studies. The Ministry of Economic Development particularly directed the consultants to utilize the statistical and factual data contained in the study: " The Panelboard Industry in British Columbia" by Caroll Hatch (International) Ltd. Consequently, where aspects have been covered by that earlier report, only summary comments are included in this study.

A substantial amount of effort was devoted to the analysis of state of the art production technology for plywood and waferboard/OSB. Whereas OSB is a new technology and most of the plants have already incorporated the latest developments, there are many very old plywood plants using outdated equipment. The extent to which these plants could be modified to reduce production costs from those currently applicable was investigated. In addition, other aspects that also affect the location of production facilities and the movement of products to market were analyzed in some depth. This analysis included:

- an investigation of some of the incentive packages offered by different governments;
- identification of tariffs and non tariff barriers and consideration of the impact of these on trade.

Another major element of the study involved identifying why consumers used structural boards and what factors influenced their choice of one board versus another. Factors such as price, the suitability of the product in use, and traditional attitudes were investigated. An analysis both of statistical data and thorough discussions with distributors and consumers was undertaken.

In addition to the qualitative analysis, a quantitative approach was taken with a detailed econometric model of supply/demand/cost. This model identified historical patterns of product movement by regions and by different categories of end use. On the basis of current macro economic projections, the regional demand for different types of product was analyzed. A number of scenarios were projected in order to assess the impact of a variety of factors such as technological improvements, tariffs and exchange rates. In addition, an assessment of the influence of government policies and the impact of tariffs overall was undertaken.

From an analysis of these factors and the different scenarios, an assessment was made of the outlook in B.C. for the production of plywood and waferboard/OSB.

Finally, recommendations are included on potential initiatives by the government.

2

DESCRIPTION OF PRODUCTS AND USES

A great variety of panel products are now being produced worldwide. A full description of these products is attached in Appendix A. The products of interest to this study are softwood plywood, waferboard and oriented strand board (OSB).

Softwood plywood is produced in B.C. in various forms. The basic species breakdown is Douglas fir plywood (DFP) and Canadian Softwood plywood (CSP). The first has face veneers of Douglas fir with the balance of the panel being any of a number of softwood species. The second can utilize a variety of other Canadian softwood species throughout the panel.

Both DFP and CSP are produced in regular and select sheathing but sanded grades are virtually all DFP and produced principally on the coast due to the log quality required.

Waferboard is produced from wafers of wood, mainly aspen. However, increasingly, other low cost hardwoods in the U.S. South and softwoods are being used. The binding agents used in waferboard production result in a product that is suitable for external use in competition with sheathing grades of plywood.

OSB is effectively "second generation" waferboard and is based on strands which can be oriented parallel and perpendicular to the panel length to provide a layered board with a strength greater than ordinary waferboard.

The resource requirements for both OSB and waferboard are relatively undemanding. Logs of almost any species can be used and with some of the latest waferizing technologies even mill waste such as slabs and edgings could be utilized. The diameter of the logs is also relatively unimportant, though the use of logs below 6" in diameter tends to be uneconomic in most mills. Even decay in significant volumes is technically acceptable, though the economics are affected since if the decayed portion disintegrates during flaking or drying it is unusable in the product and is rejected early in the process.

In contrast to reconstituted boards, the resource requirements for plywood are substantially more stringent. In earlier times only the best portion of the tree with the greatest diameter and least defect was deemed suitable for peeling. This requirement has changed over the years and plywood is now produced from logs that can be as small as 8" in diameter. However, the use of smaller logs tends to be restricted to the Interior and the output is limited to sheathing grades. In coastal mills, where there is emphasis on the production of sanded, the quality of logs required is still fairly demanding.

The impact of new technology, discussed later in Chapter 7, could result in significant changes to the type of resource needed for plywood.

The more recently developed structural panels, waferboard and oriented strand board have many properties similar to coniferous plywood and they are competing for many of the uses and markets formerly served by coniferous plywood. In some of these markets, waferboard and oriented strand board have a distinct advantage based on price. In others, price is not the governing factor and it would be premature to guess which product the users will eventually specify.

The volume uses for structural panels are for residential and non residential construction, materials handling, concrete forming, agricultural uses, do-it-yourself, and a variety of industrial products. Specific examples of some of the uses common in these categories are as follows:

A. Residential Construction - Site Built & Prefabricated

- Roof Sheathing
- Wall Sheathing
- Subfloor Sheathing
- Combined Subfloor/Underlayment
- Underlayment
- Siding
- Soffits
- Shelving
- Ridge Beams
- Garage Door Panels
- Door Overlays
- Truss Gusset Plates
- Counter Tops
- Built-Ins
- Sundecks

B. Materials Handling

- Pallets
- Slave Pallets
- Pallet Bins
  - Fish
  - Fruit
  - Vegetables
- Shelving
- Containers
- Furniture Vaults
- Packaging & Crating
- Truck Box Lining
- Truck Boxes
- Tote Boxes

C. Concrete Forming

- Residential
- Commercial
- Heavy Industrial Bridges, Dams, Tunnels, etc.

D. Construction Site Uses

- Site fencing
- Trench Shoring
- Protected Walkways
- Ramps
- Chutes
- Waste Disposal Bins

E. Agricultural

- Farm Buildings - roof, wall, ceiling linings
- Grain Storage Silos
- Pens and Partitions
- Feeders
- Truss Gusset Plates for Rigid Frames
- Vegetable Coolers and Warehouses

F. Do-It-Yourself

- Home Additions - roof wall and floor sheathing
- Repairs & Remodelling
- Built-Ins, shelves, cupboards, etc.
- Fences
- Garden Sheds
- Toys

G. Structural (Engineered) Uses

- Box Beams
- Web Beams
- Portal Frames
- Cranked Beams
- Highway Noise Barriers
- Stressed Skin Panels
- Folded Plate Roofs
- Rigid Frames
- Triangular Beams
- Barrel Vaults
- Panel Arches
- Truss Gusset Plates
- Plywood Diaphragm Roofs

H. Industrial (Remanufacture)

- Freezer Panels
- FRP Truck Walls
- Bus Manufacture - Floors
  - Seats and Seat Backs
- Rapid Transit Vehicles
- Recreational Vehicles - Campers, Trailers, etc.

I. Non-Residential Construction

- Warehouse Roof & Wall Sheathing
- Mezzanine Decks
- Thick Plywood Floors - for high loadings, fire ratings.

J. Commercial

- Storage Warehouses for salt and other chemicals
- Tool Storage Areas
- Shelving
- Spools for Wires, Cables, ropes, etc.
- Forms for Building Metal Moulds
- Industrial Scale Models
- Banquet Tables
- Bakery Storage Trays
- Liquid Storage Tanks (solar collectors)
- Furniture

K. Signs & Decorating

Highways
Gymnasium Wall Covering
Interior Decoration - displays
  - signs
  - architectural forms
Advertising Billboards

L. Marine

Boats
Forms for Fiberglass Boat Moulds
Pontoons
Ramps

M. Preserved Wood Foundations

Residential
Agricultural

It can be seen from this list that the uses are many and varied. Consequently, the specific needs of the many different types of user are also varied. Some are very stringent in their requirements; others can be easily satisfied and cost alone becomes the determining factor.

Waferboard/OSB is increasingly displacing plywood in some high volume uses, particularly in residential and other construction applications such as wall, roof, and floor sheathing, where the properties required for the end use can be met by waferboard/OSB. For structural uses, where established strength values, long term durability and high strength to weight ratios are critical, plywood continues to be the consumers' and specifiers' preferred material.

For a number of uses, there are regulations or specifications in place regarding the acceptability of product. These regulations have a significant impact on demand patterns and the current situation for the products in different markets must be understood.

Panelboard Product Standards and Code Acceptance

The Canadian panelboard industry has encouraged and supported the development of national specifications that standardize the properties and facilitate the use of Canadian plywood, waferboard and oriented strand board in Canada, the U.S.A. and overseas markets.

The Canadian Standards Association (CSA) has a worldwide reputation as a standards writing organization and certification agency. The panelboard standards are consensus standards developed by CSA within the guidelines established by the Standards Council of Canada. They are:

CSA 0121-M	Douglas Fir Plywood
CSA 0151-M	Canadian Softwood Plywood
CSA 0153-M	Poplar Plywood
CAN3 0437.0-M	Waferboard and Strandboard
CAN3 0437.1-M	Test Methods for Waferboard and Strandboard

Draft Standards

CAN3 0437.2-M	Binders for Waferboard and Strandboard
0325.0-M	Performance of Sheathing Products

These standards are the basis for the recognition and acceptance of Canadian panel products in domestic and export markets. The existence of a standard does not guarantee acceptance but without established standards, negotiations with code officials, market development and increased sales cannot be successful.

Building codes and other regulatory specifications are subject to periodic review and modification. The panel board industry must, therefore, maintain constant surveillance to ensure that no unreasonable or restrictive limitations are imposed that will prevent or curtail trade in panels made in Canada.

Plywood

Douglas fir plywood and Canadian softwood plywood, manufactured to meet CSA standards, has now received official recognition and acceptance in all overseas countries where significant markets have been identified. Those acceptances were negotiated by representatives of the Council of Forest Industries working under the Cooperative Market Development Program which is sponsored by the industry, the Provincial government and the Federal government.

Some obstacles remain. In spite of international agreements, building codes and standards continue to be used as effective non tariff barriers to trade.

In resume:

United Kingdom

Canadian plywood is recognized in B.S. 5268, The Structural Use of Timber, and quality controlled plywood from British Columbia is considered a premium product. U.S. plywood, the chief competition, is now accepted with minor restrictions applying to CD-X grades.

Germany

COFI plywood is licensed for general purpose uses and some structural applications. Knot sizes are limited in three ply panels. Unrestricted acceptance now requires complete compliance with DIN standards and this requirement is not feasible for panels made with coniferous species.

France

Canadian plywood is used for many construction end uses. Authorities acknowledge the excellent quality of CSA exterior gluelines but continue to withhold the CTB-X labelling that is required for some construction applications and to meet government purchasing requirements.

Benelux

Canadian plywood is accepted for all uses in Holland and is called up in the Dutch Timber Frame Construction Specifications. There is a possibility that certification will be required in future.

Sweden

Canadian Douglas fir plywood has been given the highest acceptance rating "P30". Canadian Softwood Plywood (CSP) a lower rating "P20". Tests are being done to support an application for P30 rating for CSP.

Norway

Canadian plywood is accepted except for floors - Norwegian support spacing and deflection limitations are too severe for panels with a standard lay up. Special lay ups could meet the code requirements.

Italy

No code problems exist at present.

Japan

Acceptances have been negotiated. Japan construction modules create some problems but these can be accommodated.

U.S.A.

CSA plywood is equal, or superior, to plywood made to U.S. specifications. However, in many jurisdictions, span rating, marking and certification by an American agency is required. At present this question is academic since the 20 per cent tariff and the volume of U.S. made plywood available curtails trade in all but special use panels.

Waferboard/OSB

Europe

Waferboard and oriented strandboard have been used for general purposes but it will be some time and require a great deal of work before acceptances similar to those applicable to Canadian plywood are obtained.

U.S.A.

Waferboard was manufactured in volume in Canada before the U.S. industry was established. Code acceptances in the U.S.A. are regulated on a regional basis and representatives of the Canadian industry did an excellent job of obtaining acceptances for waferboard in all major U.S. codes. American Standards for "Structural Panels" have now been published. This standard contains performance evaluation and marking requirements which are recognized by U.S. code authorities. Canadian panel manufacturers whose products are tested and conform to the U.S. performance standards, certification and marking requirements can thus obtain code recognition.

Performance Standards

In Canada, a CSA committee has recently been established to prepare a performance type standard for panel products used as wall, floor and roof sheathing. This standard is intended to establish tests that will measure properties and the level of performance of panels so used. It will include criteria for determining acceptable performance. The results of these evaluations should provide a sound basis for recognition in building codes. However, the final decision on acceptability will rest with code authorities not with the standard writing organization.

Harmonization with U.S. standards will be one objective of the committee.

This standard, which the committee hopes to publish in 1987, may provide a new basis for code acceptance in Canada, U.S.A. and overseas markets. It is too early to predict the impact of this development on the future use of plywood, waferboard and oriented strandboard but, it is unlikely that existing acceptances, supported by years of observed performance and field experience, are likely to be changed. The Standard will, however, provide a means of quickly evaluating new or modified products and thereby encourage experimentation and the development of new or improved panel products.

3

MARKETS FOR STRUCTURAL PANELS

Introduction

In this chapter the overall movement of structural panel products is discussed prior to a more detailed analysis of the Canadian and export markets.

Structural Board Trade Flows in North America

The current interregional trade flows within North America are relatively complicated and need to be understood in order to put the Canadian and B.C. industry into perspective. These trade flows can be summarized in point form as follows:

Western Canada

Produces almost of all Canada's softwood plywood and, currently, about 20 per cent of Canadian waferboard/OSB production. Plywood shipments are 80 per cent Canada and 20 per cent export. Imports very little. Consumes one third of Canadian plywood production and under half of regional waferboard/OSB production. The balance of waferboard is exported to U.S. West and North Central.

Eastern Canada

Produces very little softwood plywood but 80 per cent of the Canadian waferboard/OSB production of which about half is exported. The balance is used locally. Imports plywood from Western Canada.

U.S. North East

Produces very little softwood plywood but about 15 per cent of U.S. waferboard production, most of which is consumed in the region. Imports some waferboard from Canada and about two million m^3 of plywood from the South and West.

U.S. North Central

Produces very little softwood plywood but about half the U.S. waferboard production. About half of this is consumed locally and the balance shipped to other regions. Some imports of waferboard from Canada and over 3 million m^3 of plywood from the U.S. regions.

U.S. South

Produces close to 60 per cent of the U.S. plywood production volume and 20 per cent of waferboard/OSB. Consumes most of the waferboard/OSB locally and a substantial proportion of the plywood. The balance of the plywood is shipped to the North East and North Central with small volumes going to the West in addition to exports to Europe.

U.S. West

Produces about 40 per cent of the plywood in the U.S. and about ten per cent of the U.S. waferboard/OSB production. All the waferboard and over half the plywood is consumed locally and the balance sold to all U.S. regions and exported to Europe.

In summary, therefore, waferboard/OSB is produced in every region and, apart from Canadian exports, is mostly consumed in the region of production. Plywood, in contrast, is produced in only three of the regions but consumed in all. There is therefore considerable interregional product flow.

Canada

Historically, Canadian coniferous plywood production has been distributed to five major market areas: B.C., the Prairies, Ontario, Quebec/Atlantic and export. In general terms, each area has consumed about 20 per cent of total production. This percentage has varied slightly, depending on regional economic activity, while overall consumption has been governed by the more general economic situation.

Markets for structural panel products have been developed over many years and there remain few totally new, major uses to be exploited. The markets may, therefore, be considered mature and unlikely to be subject to dramatic changes apart from those resulting from fluctuations in the economy. The introduction of new or modified structural panels is unlikely to have a major impact on the overall market.

Growth in consumption will depend on population, government policies, general economic activity and other factors outside the control of panel manufacturers.

Market shares will reflect the costs of production, management efficiencies and innovative sales and distribution practices. Older, high cost plants will have to be rebuilt, renovated or retired.

Coniferous plywood and waferboard/OSB compete directly for a large segment of the structural panel markets. To date, Canadian manufacturers of these products have, in the main, struggled for shares of the residential sheathing markets. These efforts have been on a regional basis dictated by the location of the waferboard/OSB plants and the market areas most easily serviced by them.

Export markets are very important to both industries but there is little evidence that the export activities of either industry affect the other. Plywood is exported offshore and waferboard/OSB to the U.S.

Before 1979, four waferboard plants were in operation in Ontario and one in Saskatchewan, the most recent having been built in 1975. It is reasonable to assume that the distribution of shipments and market shares had become, by 1979, relatively stable. The following analysis is therefore concerned with developments since 1979.

A comparison of plywood and waferboard/OSB shipments is shown in Table 1.

Table 1

Domestic and Export Shipments
of Canadian Structural Panels
1979-1985

(thousand m^3)

	Coniferous Plywood			Waferboard/OSB		
	Domestic	Export	Total	Domestic	Export	Total
1979	1,918	454	2,372	259	269	528
1980	1,936	508	2,444	275	301	576
81	1,738	371	2,109	368	298	666
82	1,352	377	1,729	295	241	536
83	1,642	395	2,037	474	377	851
84	1,461	426	1,887	550	633	1,183
1985	1,605	418	2,023	591	740	1,331

The growth in domestic and in total shipments for waferboard/OSB compared to the decline for coniferous plywood is significant.

In 1979, plywood met 94.5 per cent of the demand for structural panels in western Canada and 82 per cent in the east. In the early 1980's four additional waferboard plants came on stream in Ontario and Quebec and by 1983 the plywood share of the market dropped to 68 per cent. It has remained at approximately that level suggesting that an equilibrium between plywood and waferboard/OSB is being reached.

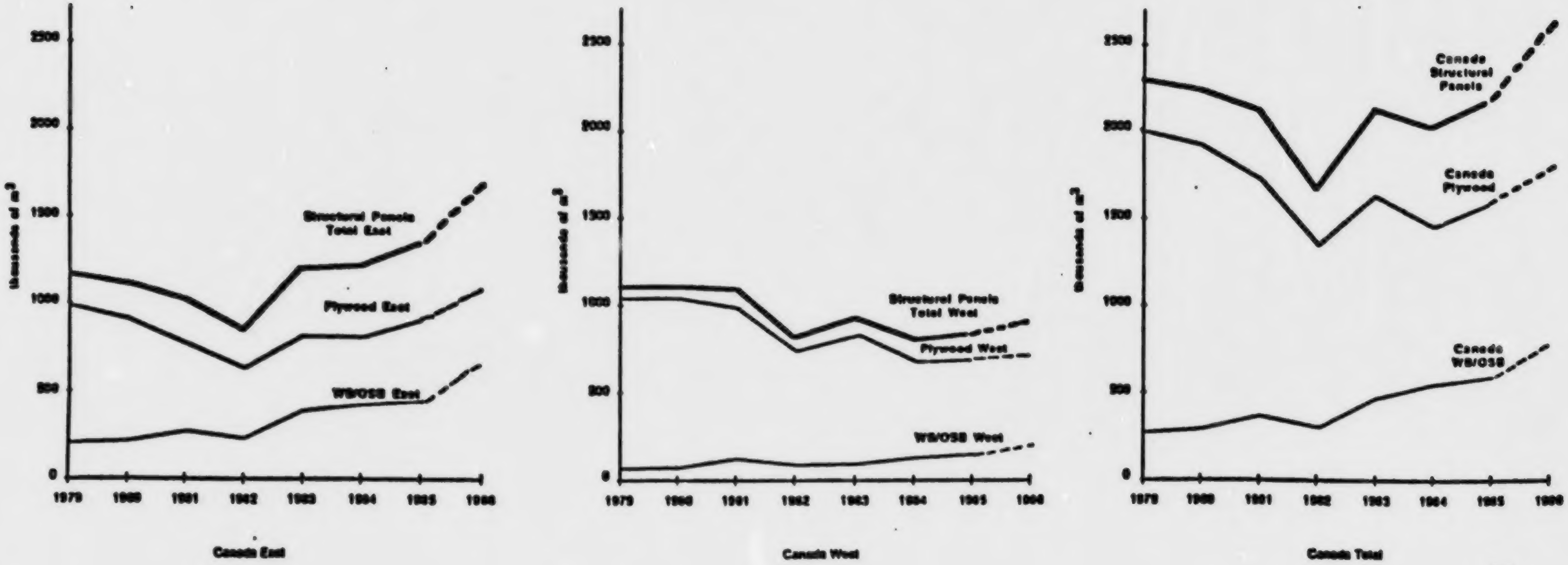
Until 1983, plywood retained 90 per cent of the market in the west, indicating that the impact of the waferboard/OSB plants in the east was regional. However, shipments from new waferboard/OSB plants built in Alberta have reduced plywood's market share in western Canada to 83 per cent and further reductions are expected.

These patterns are illustrated in Figure 1.

Figure 1

CANADIAN DISTRIBUTION PLYWOOD - WAFERBOARD/OSB 1979 - 1986

Canada West - BC, Alta, Sask, Man.
Canada East - Ont. Que. Atlantic



Source: Appendix Table 1

On a more detailed provincial basis, the regional differences are more pronounced. Thus, while in Ontario plywood has a market share of around 60 per cent, in B.C. (with no waferboard/OSB production but a long tradition in plywood production) the market share of plywood is still over 85 per cent. Detailed estimates by province are shown in Appendix Table 1.

Waferboard/OSB is offered in a single grade particularly suited for sheathing applications such as wall, roof and floor sheathing in residential construction. It is in these uses where plywood and waferboard/OSB compete directly.

In contrast, plywood is available in a number of grades suitable for a wider spectrum of end uses. Estimates of the consumption of Douglas fir and Canadian softwood plywood by grade are shown in Table 2.

Table 2

Canadian Consumption of Coniferous Plywood
By Species and Grade
volume in thousand cubic metres

	1979		1980		1981		1982		1983		1984		1985	
	Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
Canada														
D. Fir														
Sanded	341	18	360	19	327	19	291	22	329	20	300	21	310	19
Std. sheathing	347	18	375	19	280	16	222	16	268	16	212	14	239	15
Select	267	14	243	13	187	11	131	10	144	9	129	9	153	10
Total	955	50	978	51	794	46	644	48	741	45	641	44	702	44
CSP														
Sanded	-	-	1	-	3	-	11	1	-	-	-	-	3	-
Std. sheathing	866	45	856	44	831	48	626	46	804	49	702	48	763	48
Select	97	5	101	5	110	6	71	5	97	6	118	8	135	8
Total	963	50	958	49	944	54	708	52	901	55	820	56	903	56
Total Coniferous Canada	1,918	100	1,936	100	1,738	100	1,352	100	1,642	100	1,461	100	1,605	100

Shipments - Stats. Canada Cat. 35-001
Analysis and estimates - Woodbridge, Reed and Associates

In Canada, plywood consumption patterns are relatively static when analyzed by species and grade. The volumes vary for the reasons already stated.

Douglas fir sheathing consumption has declined in relation to Canadian softwood sheathing but these grades service the same markets and the percentage of total production allocated to sheathing has remained remarkably stable. Similarly, the markets for sanded and select grades do not vary.

A more detailed analysis of the consumption of the different products and specifications by province was undertaken in an earlier study. The information presented is shown in Appendix Table 2. On the basis of this study it is apparent that though the markets for concrete form panels are reasonably strong in Ontario and Quebec, the B.C. market is showing a proportionately much higher level of penetration by overlaid panels. There are also dramatic differences in market consumption of different grades, for example, in Ontario, over 20 per cent of the standard sheathing still consumed is in DFP whereas in Quebec it is under 9 per cent and in B.C. the level is over 40 per cent. On the other hand, the proportion of sanded and concrete form plywood used in each province is relatively similar for the major consuming areas.

Waferboard has been available in Ontario and Quebec for 15 years in sufficient volumes to supply any available demand at competitive prices. This competition has had a marked effect on plywood's share of the structural panel market as shown in Table 3.

Table 3

Plywood/Waferboard Shares
of the Structural Panel Markets
in Quebec and Ontario
(thousand m^3)

	Ontario				Quebec			
		Volume		Ply Share		Volume		Ply Share
	Ply	WB	Total	%	Ply	WB	Total	%
1979	413	129	542	76	365	55	420	87
1980	435	133	568	77	353	60	413	85
81	372	175	547	68	289	67	356	81
82	292	147	439	67	265	64	329	81
83	376	254	630	60	339	116	455	75
84	385	311	696	55	322	98	420	77
1985	469	320	789	59	349	109	458	76
86(e)	593	468	1,061	56	380	135	515	74

Source: Statistics Canada 35.001 Appendix Table 1

(e) based Jan/May statistics

In Ontario, waferboard volumes have been increasing steadily but it is important to note that apart from the poor year of 1982 plywood volumes have been healthy. Indeed, if 1986 continues at the rate evident in the first 5 months of the year, there will be a very substantial volume of waferboard consumed. The rapid penetration by waferboard appears to have halted however and the rate of growth has been relatively slow in recent years.

In Quebec, on the other hand, plywood still maintains around 75 per cent of structural board consumption and the rate of penetration by waferboard has been relatively slow in recent years.

Since both these markets have had waferboard available to them for many years, it was felt that a detailed analysis should provide useful information on the relationships between the products at the consumer level. Consequently, field trips were undertaken in Ontario and Quebec in the course of this study. A basic question asked during the research was "Why is plywood still used when it is being sold at such a premium?".

More detailed notes on the results of the field research are provided in Appendix B. Some of the major observations are:

- Waferboard/OSB has 80 per cent of the residential sheathing market in Ontario but a much smaller proportion in Quebec. This difference is partly due to the type of construction.
- Waferboard/OSB's share will continue to grow in Quebec.
- OSB will displace waferboard if properties are consistently superior but it is doubtful that a premium will be paid for OSB.
- Shipping costs will determine whether B.C. producers of waferboard/OSB can supply a market in eastern Canada.
- A relatively constant market for coniferous plywood will persist in eastern Canada.
- Concrete form market is almost exclusively plywood and will remain so.
- There is an unsatisfied demand for "Douglas Fir Plywood".
- Existing consumer specifications will protect and perpetuate some plywood applications for a considerable time.
- Plywood specialties and custom panels can provide a profitable outlet for innovative plywood manufacturers.
- Price relationships are strongly in favour of waferboard/OSB but there are pressures to increase price of waferboard/OSB.
- The market for plywood in preserved wood foundations is growing and offers opportunities for manufacturers that can meet the required specifications.
- Waferboard grading requires formalization and promotion.

In the final analysis it is the specifiers and consumers that determine the success or failure of a product in the market place.

The consumer's choice of materials for a particular end use is influenced by price, availability, supplier service, appearance, personal and reported experience and observed performance of the product, specifications, traditional practice and unexplainable prejudice.

In some markets, price is the determining factor. This is usually so when large volumes are involved and the properties of the products available are adequate for the use intended. Sheathing applications in large housing developments are an example.

In June 1986, in Ontario, 3/8" plywood was selling wholesale at a premium of 35-40 per cent over 7/16" waferboard; 5/8" plywood was 50-60 per cent over 5/8" waferboard, a difference of $90-100 per thousand square feet for wall and roof sheathing and $190-200 per thousand for floor sheathing. At these levels it is estimated that more than 80 per cent of the house sheathing being used was waferboard. The principal reasons that this proportion was not still higher was lack of availability in more remote areas and the traditional view that plywood is more acceptable and presents a quality image to the home buyer.

One might conclude that, for sheathing uses, and for other applications where the substitution of waferboard for plywood on a thickness for thickness basis can be justified, the market for plywood would decline rapidly and eventually dry up. This decline has not happened even though the production capacity of waferboard plants, located in Ontario, is large enough to supply all the sheathing uses described above.

Consumers state that they continue to specify and use plywood because they:

- are familiar with its properties;
- know how it performs under a variety of conditions;
- are aware it is called up in established specifications;
- can get prompt delivery from their regular suppliers;
- are able to sell it as a premium application;
- estimate that, when incorporated in a manufactured article, the cost of the plywood is low in relation to the labour and other materials used and substitution involves unnecessary risk.

It was shown that the rapid decline in the plywood market share evident earlier has now slowed. It appears that the sectors of easy penetration by waferboard/OSB have been captured and now consumer attitudes together with specific needs make continued penetration more difficult.

For example, plywood is the preferred material for concrete forms and any serious competition it faces in that market is more likely to come from imported plywood especially adapted for that use than from waferboard/OSB.

Several plywood manufacturers are catering to selected markets and tailor their products to meet the customers specifications or end use. Delivery, flexibility and reliable supply play an important part in ensuring these manufacturers of a secure slot in the market.

In addition, for the reasons stated above, many consumers continue to specify plywood for uses where waferboard is a cheaper and acceptable alternative.

The plywood manufacturers who can look to the future with some assurance are those who develop products designed for selected markets or customers and who provide superior service.

In Western Canada, the transition from plywood to waferboard has been slower than in the east. Consumers have been less inclined to change from the locally produced familiar product, however, availability of supply and distribution have been the principal reasons that the use of waferboard/OSB has grown at a slower rate.

In the last two years the production of waferboard/OSB plants in Alberta has increased supply and initiated more rapid growth. Market share is still below eastern Canadian levels but similar patterns are developing - Table 4.

Table 4

Estimated Waferboard/OSB Share of Structural Panelboard Markets in the Western Provinces and in Canada West and Canada East

Waferboard/OSB Per Cent

	B.C.	Alta.	Sask.	Man.	Canada West	Canada East
1980	0.8	4.3	20.3	20.8	5.9	18.9
81	2.3	9.3	24.4	22.1	9.7	25.7
82	2.6	9.9	19.4	17.6	9.0	26.2
83	5.2	11.3	16.8	15.8	9.9	32.0
84	10.8	17.1	30.0	18.0	16.1	34.6
1985	11.7	18.5	30.6	19.2	17.4	32.8
86	14.4	23.8	36.3	22.6	21.6	36.6

Source: Appendix Table 1

The use of waferboard/OSB will, inevitably, increase more rapidly in British Columbia as supply from Alberta and B.C. mills grows. This growth will challenge B.C. plywood producers to divert a larger portion of their sales to overseas markets, to capitalize on the freight advantage they enjoy over waferboard in B.C. and to develop products that are not in direct competition with sheathing uses of waferboard/OSB.

Export Markets

To date Canadian exports of panelboards have been in the form of waferboard/OSB to the U.S. and plywood to offshore markets. Offshore exports of waferboard and plywood exports to the U.S. have both been small. The relative importance of shipments to domestic versus export shipments is shown in Table 5.

Table 5

Canada - Structural Panel Shipments
(thousand m^3)

		Domestic	Export		Total Shipments
			U.S.A.	Other[1]	
1980	Ply	1,936	8	500	2,444
	WB/OSB	275	301	-	576
1981	Ply	1,738	7	364	2,109
	WB/OSB	368	298	-	666
1982	Ply	1,352	15	362	1,729
	WB/OSB	295	241	-	536
1983	Ply	1,642	18	377	2,037
	WB/OSB	474	377	-	851
1984	Ply	1,461	9	417	1,887
	WB/OSB	550	633	-	1,183
1985	Ply	1,605	21	397	2,023
	WB/OSB	591	740	-	1,331

Source: Statistics Canada

[1] Total exports of waferboard are shown under U.S.A. only, since reliable estimates put other exports below 1% of total.

Canadian exports of coniferous plywood originate in British Columbia and the only serious competition to date is from the U.S.A.

Canadian and U.S. export markets for coniferous plywood are shown in Table 6.

Table 6

Exports of Coniferous Plywood from Canada and U.S.A. 1980-1985

(thousand m^3)

Destination	1980			1981			1982			1983			1984			1985		
	Can	USA	Tot	Can	USA	Tot	Can	USA	Tot	Can	USA	Tot	Can	USA	Tot	Can	USA	Tot
United Kingdom	190	65	255	188	117	305	162	95	257	189	145	334	199	90	289	214	58	272
EEC other than U.K.	282	185	467	155	306	461	172	210	382	153	260	413	186	139	325	157	140	297
Total EEC	472	250	722	343	423	766	334	305	639	342	405	747	385	229	614	371	198	569
Japan	26	7	33	18	4	22	20	6	26	25	5	30	22	6	28	20	5	25
Other	11	72	83	10	177	187	23	87	110	28	95	123	19	91	110	27	77	104
Total Exports	509	329	838	371	604	975	377	398	775	395	505	900	426	326	752	418	280	698

Source: Statistics Canada
Madison Reporter

Canada's performance in the export markets compares favourably with the U.S.A. particularly when U.S. shipments to military bases overseas are taken into account.

As indicated in Figure 2, U.S. competition is substantial. However, the increased supply, occasioned by U.S. entry into the market and the promotional activities accompanying their entry, resulted in an overall expansion of consumption in earlier years. There is, moreover, room for further growth especially if more favourable tariffs or an expanded duty free quota can be negotiated.

Table 7 shows the relative importance of the principal Canadian export markets that have been developed to date. It should be noted that the data available are based on shipping documents and the importing country shown does not necessarily reflect trans shipments. The final destination of the goods and the market for them may, therefore, be in another country.

The United Kingdom which consumes up to 50 per cent of total exports, is the most important market followed by the other countries of the EEC. Exports to the EEC in total consume 90 per cent of Canada's exports, underlining the importance of seeking freer entry for coniferous plywood into the EEC.

Table 7

Canadian Exports of Coniferous Plywood
By Market

Per Cent of Total Exports

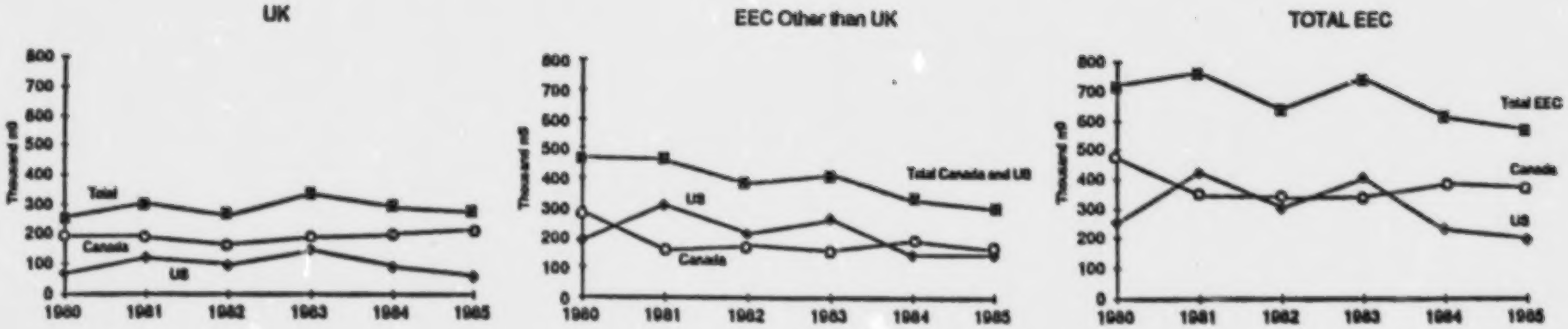
Market Area	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**
EEC								
United Kingdom	43.2	38.4	37.3	50.7	43.1	47.8	46.7	51.1
Ireland	0.1	0.2	0.7	1.4	0.7	1.3	1.5	2.0
Benelux	5.2	3.1	7.5	8.9	9.8	8.5	13.9	9.0
Denmark	10.1	11.0	8.0	2.3	7.9	5.5	8.4	7.8
France	3.8	6.3	7.8	4.6	3.9	2.6	3.2	3.7
Germany West	8.5	15.4	13.4	11.8	12.5	14.4	8.9	8.1
Greece	-	-	-	-	-	-	-	-
Italy	1.9	3.8	6.1	6.2	3.5	3.1	4.3	3.4
Netherlands	25.3	17.0	11.9	6.4	7.3	3.3	3.4	3.8
Total EEC	**98.1**	**95.2**	**92.7**	**92.3**	**88.7**	**86.5**	**90.3**	**88.9**
Japan	0.2	1.6	5.1	4.8	5.2	6.3	5.3	4.7
U.S.A.	0.7	0.5	1.5	2.0	4.0	4.6	2.1	5.0
All other countries	1.0	2.7	0.7	0.9	2.1	2.6	2.3	1.4
Total Exports	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Statistics Canada

Figure 2

CANADA/USA EXPORTS OF CONIFEROUS PLYWOOD TO UK & EEC

Thousands of cubic meters



Canadian plywood exports by species and grade as shown in Table 8 indicate a steady decline in Douglas fir sanded shipments. This decline is likely a result of limitations in supply available for export at the returns to be obtained and U.S. competition for this segment of the market. In fact, the volume of DFP has dropped steadily reflecting changes in the industry as coastal mills have closed. There has been a corresponding increase in CSP (Figure 3). In total ,the export market for Canada has gradually improved since 1981.

Table 8

Canadian Exports of Coniferous Plywood
By Species and Grade
1979-1985
thousands of cubic metres

	1979		1980		1981		1982		1983		1984		1985	
	Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
D. Fir														
Sanded	90	20	101	20	59	16	46	12	58	15	55	13	49	12
Std. sheathing	41	9	57	11	37	10	40	11	48	12	45	10	39	9
Select	76	17	59	12	61	16	42	11	69	17	33	8	50	12
Total	207	46	217	43	157	42	128	34	175	44	133	31	138	33
CSP														
Sanded	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Std. sheathing	153	33	193	38	140	38	170	45	150	38	203	48	196	47
Select	94	21	98	19	74	20	79	21	70	18	90	21	84	20
Total	247	54	291	57	214	58	249	66	220	56	293	69	280	67
Total Coniferous Export	454	100	508	100	371	100	377	100	395	10	426	100	418	100

Shipments: Exports By Commodities - Statistics Canada
Species, grade - Woodbridge, Reed estimates

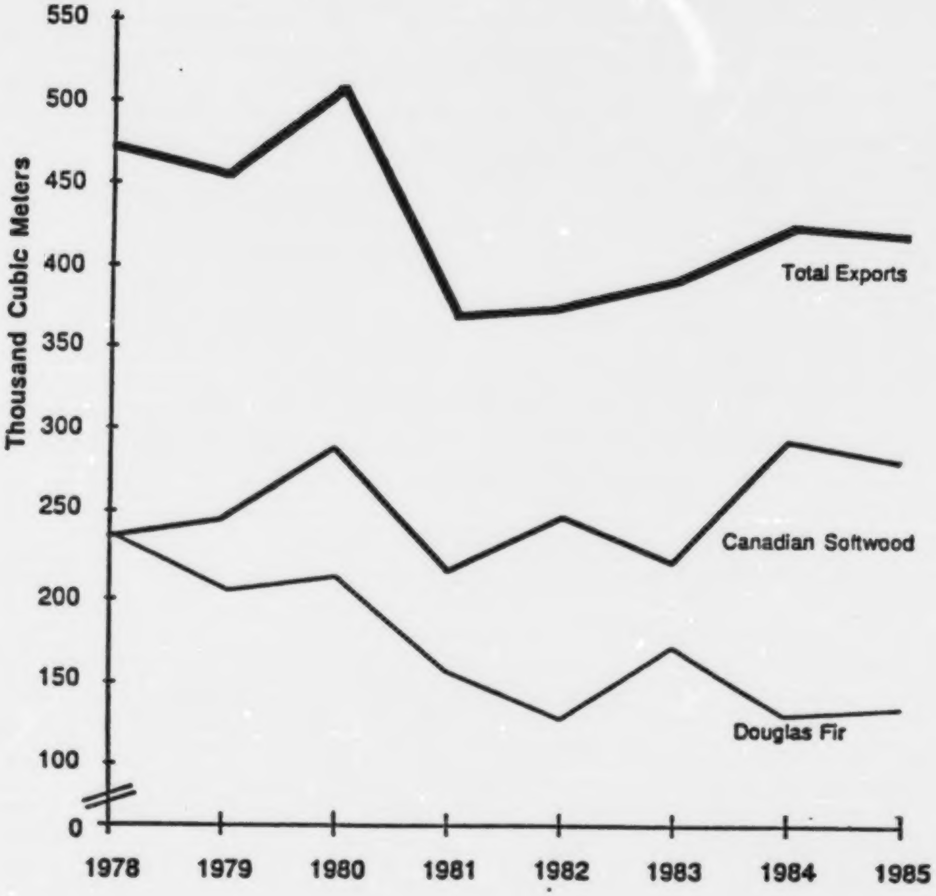
Of concern is the steady decline in the sales of coniferous plywood to continental markets and Canada's declining share of some markets, in particular, the Netherlands and Germany where it appears the U.S. is concentrating its sales efforts. These countries used to be Canada's best customers outside of the U.K.

In Canada's favour is its reputation as a reliable constant supplier to its established markets. An expansion of export sales would support this reputation. Figure 2 illustrates Canada's commitment to the export market as opposed to the more volatile approach evident in the U.S.

To increase exports of coniferous plywood from B.C. to Europe will require continuing and intensive promotion, market development and the use of aggressive sales and distribution practices.

Figure 3

CANADIAN EXPORTS OF CONIFEROUS PLYWOOD 1978-1985



Japan

On a per capita basis, the Japanese are one of the world's largest users of plywood. There is a tradition of wood use in housing and no reluctance to use wood products and experiment with new applications.

Promotion by representatives of the B.C. industry, supported by large Japanese firms such as Mitsui Home Co., introduced the Canadian wood frame system (the 2x4 house) to builders and the Japanese public. Acceptance has been enthusiastic. The system follows Canadian practice but the long established and traditional Japanese modules have been incorporated resulting in demands for 3'x6' panels which cannot be produced economically in Canadian plants. Mitsui accepted 4'x8' panels which they cut to meet the module and found a profitable market for the off cuts.

The market for imported softwood plywood has grown but has now reached a plateau. Supplies from S.E. Asia and coniferous plywood made in Japan are filling a large part of the demand.

Investigation of the concrete form market, which is very large in Japan, established the acceptability and superior performance of B.C. plywood but again, the established module thwarted attempts to introduce 4'x8' panels in any significant volume.

The Japanese market is steady (Table 6). There will be growth but it is difficult to project any dramatic increase unless there are some fundamental changes, apart from some reductions in tariff, such as the availability of 3'x6' plywood from B.C. or a large increase in 2x4 housing.

4

SUPPLY/DEMAND OUTLOOK

Introduction

This chapter investigates the relevant macro economic factors and likely effect of these on the total demand for structural panels. The outlook for new supply and any possible constraints due to resource availability are discussed in overall terms, while a more detailed analysis is provided of the outlook for western Canadian supply.

Macro Economic Factors for North America

In the earlier analysis of markets, supply and product flow it was shown that there is a substantial product and regional interrelationship. Consequently the outlook for any one product in any one region is influenced by the likely activity in the total North American context. It is necessary, therefore, to consider the general picture before analyzing the particular.

The principal consumer activities that affect the demand for structural panels are:

- housing starts;
- non residential construction;
- repairs and alterations;
- industrial production.

Future activity in these sectors is closely related to factors such as demographics, overall GNP growth, interest rates, exchange rates and so on.

Resource Information Systems Inc. (RISI) draws upon the macro economic projections prepared by Data Resources Inc. (DRI) in order to develop indicators for the outlook of the consumer activities that have an impact on the demand for structural panels.

The latest forecast for the outlook in North America is follows:

U.S.

"Economic growth will accelerate and last through 1988 or 1989, if protectionist excess can be avoided. Politics, weak dollar and oil suggest a recession in 1990. The 1990's will see modest growth, but more stability" - May 1986 Forsim Review - RISI.

Though there are some concerns about the tax reforms currently underway, the latest indications are that there should still be steady growth in GNP. This growth may occur at a somewhat lesser rate than earlier forecast but would be compensated by a shallower recession in 1990.

The projections for interest rates and GNP growth are shown in Table 9. The outlook for interest rates is relatively stable with no indication that the very high levels prevalent in the early 1980's will recur.

Table 9

Trends and Projections for Interest Rates and GNP
(per cent)

	Prime Interest Rate	Real GNP Growth
1980	15.3	-0.3
81	18.9	2.5
82	14.9	-2.1
83	10.8	3.7
84	12.0	6.5
1985	9.9	2.2
86	8.5	2.3
87	8.0	2.8
88	8.4	3.6
89	9.3	3.4
1990	9.4	-0.5
1991-1995	7.8	2.7
1996-2000	8.1	2.5

Source: RISI

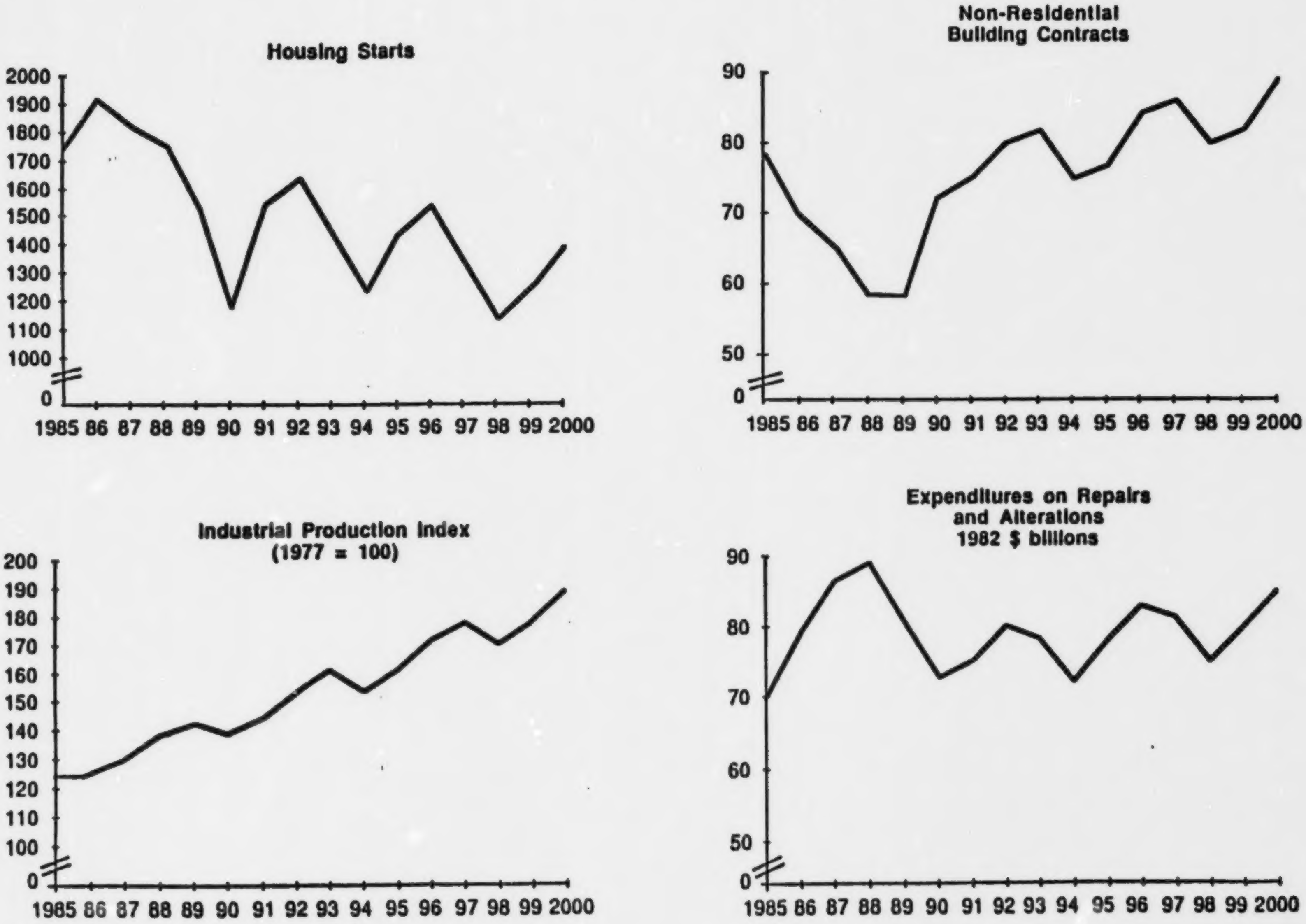
The outlook for the consumption sectors of relevance to structural board demand is shown in Figure 4.

Housing Starts

A significant decline is projected after the peak level of 1.93 million expected in 1986. The year 1990 is projected at only 1.2 million - a level only marginally above the bad years of 1981/82. During the 1990's, housing starts should continue to follow a 4 to 5 year cycle but the numbers will not return to current levels.

Figure 4

ECONOMIC INDICATORS
U.S.



Repairs and Alterations

The expenditure on repairs and alterations is projected to increase very slowly at an average rate of less than one per cent from 1985 to 2000. It is estimated, however, that there will be significant fluctuations around this virtually static trend. Again, 1990 is projected to be a particularly poor year, though even in that year the amount spent, in constant dollars, should be marginally above 1985 levels.

Industrial Production Index

The average growth in this index is projected to be comparatively encouraging. From 1985 to 2000 the growth is expected to average nearly 3 per cent per year though cyclical fluctuations indicate reduced activity in some years, such as 1990.

Non Residential Construction

Significant declines are projected for 1986 and 1987 with modest growth thereafter. Over the whole period, the growth averages about 1.5 per cent per annum.

Canada

The projections of the macro economic factors for Canada are somewhat more encouraging than for the U.S. Growth in GNP for 1987 and 1988 is projected at close to 4 per cent.

In 1990 the expected recession in the U.S. will affect the Canadian economy so that GNP growth will be reduced to zero in that year but thereafter a slow growth, marginally above that of the U.S., is projected.

The projections for the major activities that affect structural panel demand are shown in Figure 5.

Housing Starts

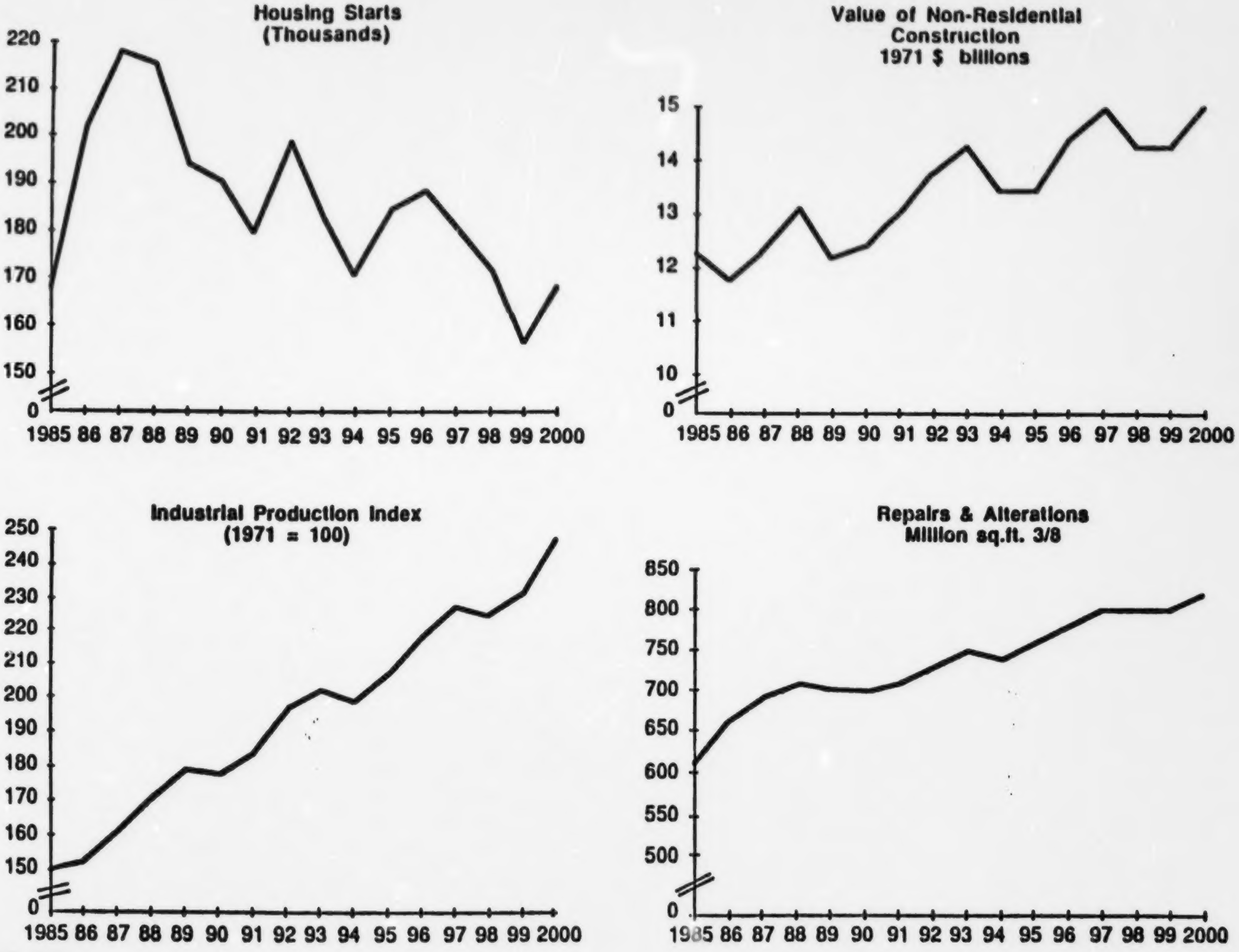
The major characteristics of the Canadian population forecasts are:

- a slow down in growth;
- an aging of the population;
- reduced relative importance of immigration from other countries;
- increased inter-provincial migration.

As a result, the long term outlook for household formations is for a decline. The projections for housing, therefore, are that after some relatively strong years in the late 1980's, with levels up to 210,000 housing starts, the numbers will decline to around 170/180,000 units over the 1990's.

Figure 5

ECONOMIC INDICATORS
CANADA



SOURCE: RISI

Non Residential Construction

Over the period 1985-2000, expenditure in non residential construction is estimated to increase at an average annual rate of 1.5 per cent. The projections show some fluctuation around this increase with poor years in 1989 and 1995 balanced by peak years in 1988, 1993 and 1997.

Industrial Production

The index for industrial production is projected to show substantial gains throughout the period with one or two minor reductions. The growth over the whole period is very encouraging, averaging over three per cent per annum from 1985 to 2000.

Repairs and Alterations

The very strong growth that has been apparent in the volume of repairs and alterations is expected to slow down by the end of the 1980's. It is projected, however, that there will still be an increase and this sector of consumption will continue to be of considerable importance.

Exchange Rate

Trends in the exchange rate are of vital importance to the Canadian economy in general and to the potential flow of product across the border. The projections by RISI for future levels are shown in the following table.

Table 10

Exchange Rate Projections
Cdn $/U.S. $

1985	1.37
1986	1.39
1987	1.38
1988	1.35
1989	1.33
1990	1.30
1991-1995	1.25
1996-2000	1.21

It is projected that the declines in the value of the Canadian dollar relative to the U.S. dollar that occurred in the early 1980's will be halted. Though no dramatic changes are projected, it is expected that there will be a gradual strengthening in the Canadian dollar.

Overall Demand Outlook for Structural Panels

As a result of the macro economic factors and the more specific projections of activities in the main consuming sectors that affect the demand for structural panels, RISI has developed projections for the volumes to be required up to the year 2000. The quantities projected are shown in Table 11.

Table 11

Control Projections for Structured Panel Demand[1]
in North America
Million m^3

	Canada	U.S.	Total
1979	2.3	17.4	19.7
1980	2.1	15.3	17.4
81	2.2	14.7	16.9
82	1.8	14.0	15.8
83	2.1	17.5	19.6
84	2.1	20.1	22.3
1985	2.2	20.7	22.9
86	2.4	23.1	25.5
87	2.6	23.5	26.0
88	2.7	23.5	26.2
89	2.6	22.2	24.8
1990	2.6	20.1	22.7
91	2.6	22.5	25.1
92	2.8	23.9	26.7
93	2.8	23.5	26.3
94	2.8	22.2	25.0
1995	3.0	24.3	27.3
96	3.1	25.5	28.6
97	3.1	24.9	28.0
98	3.1	23.5	26.6
99	3.1	24.9	28.0
2000	3.3	26.7	30.0

[1] Excludes offshore exports
Source: RISI Control Forecast

The outlook for Canada is seen to be very encouraging. In spite of the decline projected in housing, the strength of the other consuming sectors is such that by the year 2000, consumption is projected at around 50 per cent higher than current levels.

Though the levels of demand in the U.S. are also projected to increase, the rate of increase is considerably less than for Canada. Furthermore, the recession projected for 1990 is considered likely to have a significant impact on demand. Thereafter a slow growth is expected, with some negative fluctuations, reaching a volume in the year 2000 which is over 25 per cent higher than 1985 level.

In addition to North American demand, it is also necessary to consider the outlook for the demand from the offshore export markets. This demand is effectively all in the form of plywood but it is worth considering first, the situation for other structural boards.

Currently the volume of exports of OSB or waferboard from North America are minimal but the markets that might have potential are Europe and Japan.

An OSB plant came onstream in Scotland in 1985 and a plant is under construction at present in France. It is conceivable that the presence of local production could develop product acceptance which would then open the markets to imports. However, with the costs of transportation from North America, a tariff barrier of 10 per cent and possibly non tariff barriers related to codes, it would likely be overly optimistic to expect any significant increase in exports of these products to the EEC.

The potential in Japan or other Pacific Rim countries is difficult to assess. Sales efforts to date have provoked little reaction apart from a few trial parcels. It is possible that a major government supported technical promotional program could provide the necessary impetus to open the market. It is not possible within the terms of reference of this study to analyze this potential.

The levels projected under the RISI control forecast for structural board offshore exports from U.S. and Canada are shown in Table 12. On the basis of the current situation, it must be assumed that the great majority would be in plywood.

Table 12

Structural Board Exports from North America
thousand m^3

	Canada	U.S.	Total
1986	345	435	780
87	400	435	835
88	425	425	850
89	425	450	875
1990	360	380	725
1991/95	365	360	725
1996/2000	330	390	720

These export levels are relatively small in comparison with overall North American demand. Nevertheless exports from B.C. are an important outlet for B.C. plywood producers. The RISI projections shown above are based on the assumption that a relatively stable situation is likely to continue in the export market.

In total, therefore, it is evident that the RISI control forecast is projecting an overall increase in the consumption of structural boards. This projection is based on the outlook for the macro economic factors and the indications of activity in the sectors of the economy that consume structural boards.

The American Plywood Association (APA) has also developed forecasts recently (May 1986) for U.S. consumption levels up to 1991. After adjusting for exports and imports, these levels can be compared with the RISI control projections as follows:

	RISI	APA
	million m^3	
1984	20.1	19.8
1985	20.7	20.6
86	23.1	23.7
87	23.5	23.1
88	23.5	23.6
89	22.2	24.8
1990	20.1	25.8
91	22.5	26.3

Though there is close agreement up to 1988, thereafter the two forecasts vary widely.

The APA is substantially more optimistic and does not appear to acknowledge the possibility of an economic slowdown during the period. In addition, the APA is projecting very substantial increases in exports with the volume in 1991 from the U.S. alone exceeding 1 million m^3.

The projections developed by RISI result from a detailed analysis of past activities and are based on input obtained from DRI for the macro economic factors. In addition, RISI has many clients throughout North America who themselves form part of the overall input through a continuing interchange of information. Consequently, it is believed that, at least for the development of overall demand projections, the levels provided by RISI should give a good indication of the outlook. They are clearly well below the APA estimates but it is believed that they are developed from a more reliable base.

On the basis of the outlook projected by RISI, it would appear that the overall outlook for structural panel products is one of some overall growth with cyclical fluctuations. This outlook has a significant impact on the subsequent analyses in the study which focus on the specific outlook for B.C.

Clearly, if the outlook had been for a static or declining demand, the overall context within which to consider the B.C. situation could be substantially different.

It must be emphasized, however, that the projections can only be regarded as indications of future demand trends rather than definitive figures for each year. Many elements could change. The cyclical fluctuations in the demand factors could be incorrect, either in terms of timing or in amplitude. In the development of product demand projections, from trends in major economic factors, certain use factors within various consumption sectors have been utilized - for example average house size and therefore the volume of structural panel required. Historic trends for these use factors have been projected. Changes which are unforeseen at present could occur. For example, the acceptance of treated wood foundation at the builder and purchaser level could increase dramatically thus increasing the use of structural panels. Alternatively, new prefabricated house building systems (such as PALC in Japan) may become popular, reducing the use of wood based materials.

These are necessary "caveats", nevertheless in the development of ideas, policies or strategies that relate to the future some projections are essential. These have to be based on what is currently known. The more general the projection the greater the likely accuracy. As the projections become more specific to region, consuming sector or product, the impact of unforeseen factors becomes more significant and the likely accuracy of the projections diminish.

New Supply Outlook

In recent years almost all new supply in structural panels has been in reconstituted boards. In the plywood industry, though there has been some modernization that has increased capacity, there have been virtually no greenfield (i.e. totally new facility) mills since before 1980. At the same time, it is significant to note that plywood production in the U.S., in contrast to Canada, has been increasing and in 1985 was at a record level (see Table 13). Though this volume of over 20 billion sq. ft. 3/8 is only marginally above the previous peak level in 1978, it is nevertheless a significant improvement over the 1980 levels. Though there have been a number of mill closures, these have been more than offset by the additional production volumes at the remaining plants.

Table 13

Structural Panel Production
U.S.
million m3

	Plywood	OSB/Waferboard	Total
1980	14.4	0.2	14.6
81	14.8	0.3	15.1
82	14.0	0.5	14.5
83	17.3	1.1	18.4
84	17.6	1.8	19.4
1985	17.8	2.4	20.2

Source: APA

A fundamental reason for this growth has been the substantial increase in demand for structural panels. The sizeable increases in production of OSB/Waferboard have been absorbed into the market while still leaving room for growth in plywood.

The development of new supply of structural panels is dependent, according to conventional wisdom on the availability of a resource of suitable quality, the markets and the economics of production. Whereas the last two points are naturally very critical the first is now of less significance.

Traditionally, plywood has been dependent on a supply of peeler logs. As production technologies have changed the definition of what is peelable has also changed. In earlier years only the large Douglas fir peelers of over 24 inches in diameter were deemed suitable. The introduction of retractable chucks and other advances resulted in a reduction in log quality requirements. Consequently by the 1970's logs down to 9" or 10" diameter, with little or no clear fibre present, were being peeled. The latest developments, discussed in more detail later in this report, could result in the use of even smaller logs. As a result of these developments, there is little restriction in the availability of suitable quality from the forest resource.

Similarly, OSB/waferboard can also utilize almost any timber available from the forest - hardwoods and softwoods alike. Therefore, the physical availability of resource is not a restricting factor.

New supply will depend, therefore, principally on the economic supply of fibre (relatively unconstrained by quality demands), the location of the market and the cost of production.

As a result of these factors, the initial development in Canada for OSB/Waferboard was mainly in central Canada and, in the U.S., first the North Central and subsequently the South. Activity then moved to the west both in Canada and the U.S.

At present, the additional capacity that is either under construction or seems probable in the next two/three years is distributed as follows:

Canada	150,000 m^3	Central/East
Canada	500,000 m^3	West
U.S.	550,000 m^3	South
U.S.	300,000 m^3	North Central
U.S.	100,000 m^3	West
Total	1,600,000 m^3	

At this time there is no indication that there will will be any new supply resulting from greenfield plywood/veneer operations.

Due to the very large number of plywood plants that exist in North America, it is not possible to obtain any indication of new supply resulting from modernization. In addition, it is difficult to predict the extent to which these may be offset by closures of the less efficient operations in the West or the older mills in the South.

However, with the increases forecast in waferboard/OSB, there would appear that there is little room to market any substantial increases in overall plywood supply in the U.S. in the next 5/10 years. The APA has projected significant increases but these are based on a much more optimistic outlook of overall demand.

It is apparent therefore that mills with comparatively high costs of production will continue to be under considerable pressure when their product lines must compete directly with operations that can manufacture the same or equivalent product more economically (e.g. OSB in competition with sheathing plywood).

It should be emphasized that this analysis has considered the North American situation in total. There are regional differences and the situation relative to B.C. is discussed in more detail below.

Supply/Demand Outlook for Western Canada and U.S.

CONTROL PROJECTION

Though the objective of the study is to define the outlook for B.C., it is not possible to separate out the impact of developments in Alberta. Consequently, the following analysis considers B.C. and Alberta as a single entity both for demand and supply of the different types of structural board.

In the earlier analysis of the overall outlook for the economy and those sectors of relevance to the consumption of structural board, it was demonstrated that there should be some growth over the long term. In the next few years, however, the outlook for the U.S. is not for any substantial growth and there is likely to be a significant decline around 1990.

A more detailed computer model was prepared by RISI to show likely demand levels in B.C. and Alberta and the U.S. West under the control forecast scenario. On the basis of these overall demand levels for structural board, RISI undertook a further analysis of the likely demand in terms of the different types of panel. For the U.S. this analysis is broken down into rough plywood (i.e. sheathing), sanded plywood (includes specialties) and OSB/waferboard. For Canada, unfortunately, the split is only between plywood and OSB/waferboard since there are no historical data for sanded consumption in Canada.

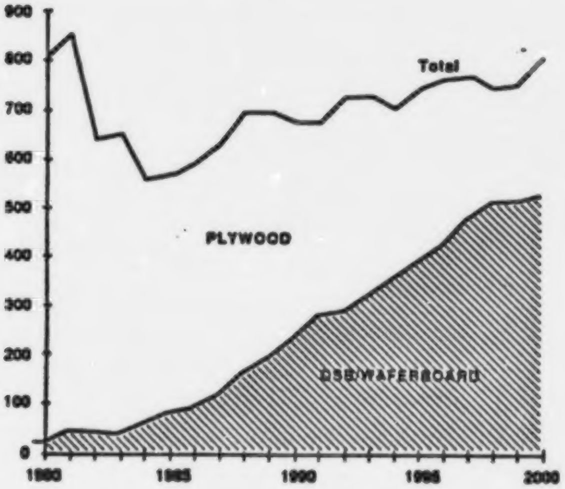
The calculation of how the demand is satisfied by the different products is driven mainly by the production costs of the different boards in various locations but tempered by consumer acceptance factors. The full results obtained from the RISI model are shown in Appendix Table 3 and presented graphically in Figures 6 and 7.

Figure 9 shows that the projections indicate a very poor outlook for the local sales of the B.C. plywood producers. From a 1985 market share of over 85 per cent it is projected that by 1995 the share will have dropped to 50 per cent. Though some increase in demand is projected this trend suggests a substantial drop in plywood sales locally.

Figure 6

B.C./ALBERTA STRUCTURAL BOARD DEMAND

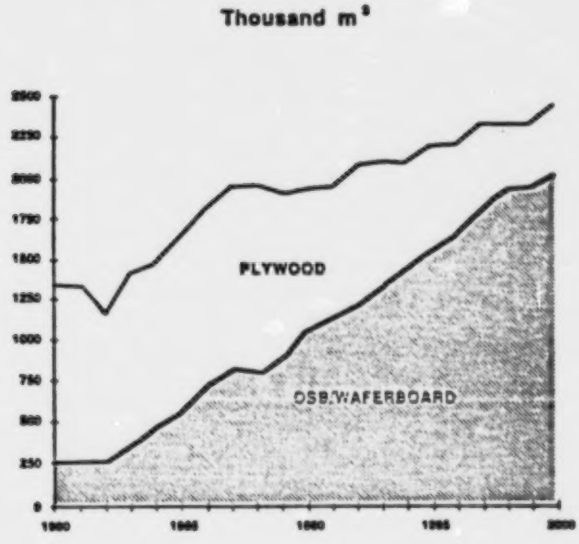
Thousand m^3



SOURCE: RISI control forecast

Figure 7

CANADIAN STRUCTURAL BOARD DEMAND
EAST OF ALBERTA



SOURCE: RISI control forecast

The major demand on B.C. mills is from Central Canada. The RISI control projections for Canada east of Alberta are shown in Figure 7. It is evident that here too the plywood share is due to decrease.

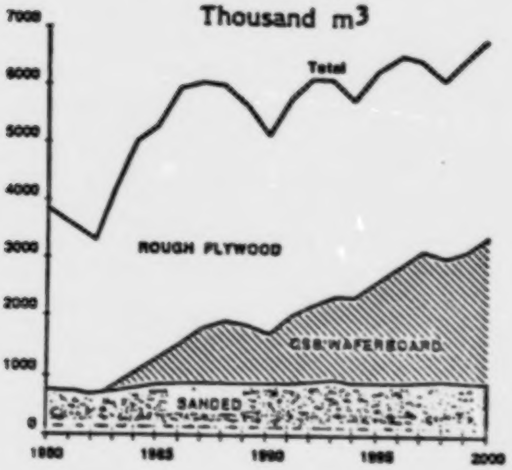
Currently it is estimated that plywood has over 60 per cent of the market (much lower than in the West since waferboard has long been available). This share is projected to decline to less than 50 per cent by 1990 and only 30 per cent by 1995. Though overall markets are expanding, substantial reductions are projected for plywood.

The situation in the U.S. West is shown in Figure 8 and indicates a somewhat different outlook. Currently plywood is at close to 90 per cent and by 1990 is projected to drop to just under 85 per cent. Even by 1995 plywood still commands almost 75 per cent of the market. It is particularly significant to note that sanded plywood volumes remain relatively static throughout the period.

Figure 8

US WEST STRUCTURAL BOARD DEMAND

Thousand m^3



Source: RISI control forecast

The outlook for shipments of OSB produced in B.C. and Alberta is shown in Table 14. These are based on the projections for substantial penetration domestically by OSB but a lower level of penetration in the U.S. West.

Table 14

Estimated OSB/Waferboard Shipments from B.C./Alberta (thousand m^3)

	B.C./ Alberta	Other Canada	U.S. West	Total
1985	80	20	150	250
86	90	30	150	270
87	115	40	200	355
88	160	45	325	530
89	195	45	415	655
1990	230	50	400	680
91	275	55	415	745
92	290	55	495	840
93	320	55	540	915
94	350	60	540	950
95	390	65	565	1,020
1996/2000	480	70	625	1,175

Source: RISI control forecast

Rapid increases are foreseen for the next two to three years and a comparison with new capacity already announced indicates that this expansion should be well within production capability. The following plants already exist or are likely to be in full production by the end of 1987.

		thousand m^3
Weldwood	Slave Lake	115
Pelican	Edson	220
Pelican	Drayton Valley	220
Louisiana Pacific	Dawson Creek	220
Total		775

Given the RISI control forecast projections it would appear that, in total, these plants are not projected to reach 90 per cent of capacity until 1991. It should be noted that the small volume shipments shown for 'other Canada' are essentially to Saskatchewan and Manitoba. Transportation costs to move the product further east in the face of current and projected new capacity in that area are assumed to be too great to allow for more than minimal volumes.

The inability to market the product further east would suggest that, even with the high rate of penetration forecast into the B.C./Alberta market, there is little potential for additional waferboard/OSB supply for some years. On the other hand, the rate of penetration allowed in the U.S. West for waferboard/OSB is relatively low. This aspect is discussed later in this chapter.

The RISI control projections for export indicate a relatively static outlook up to the early/mid 1990's but with an overall declining trend thereafter.

In summary, therefore, the scenario under the control projection indicates the following major developments:

- The demand for plywood in B.C./Alberta will drop from around 500,000 m^3 currently to 440,000 m^3 in 1990 and only 350,000 m^3 in 1995.
- East of Alberta, the demand for western plywood will drop from the present level of close to 1,100,000 m^3 to 900,000 m^3 in 1990 and 650,000 m^3 in 1995.
- OSB/waferboard production/market for B.C./Alberta will reach 90 per cent of current and planned capacity by 1991.

The outlook is therefore less than promising with a loss of 600,000 m^3 of plywood demand (the output of more than five mills) by 1995 and no room for new OSB expansion until the early 1990's.

An outlook of this nature would have a very severe impact on the B.C. industry and cannot be accepted without further analysis. This analysis takes two forms. The first is to subject the computer model to some sensitivity tests varying some of the basic assumptions. The second is to examine the outlook in a more judgemental manner putting less emphasis just on comparative production costs and more on market attitudes.

SENSITIVITY ANALYSIS

1. Low Cost Simulation

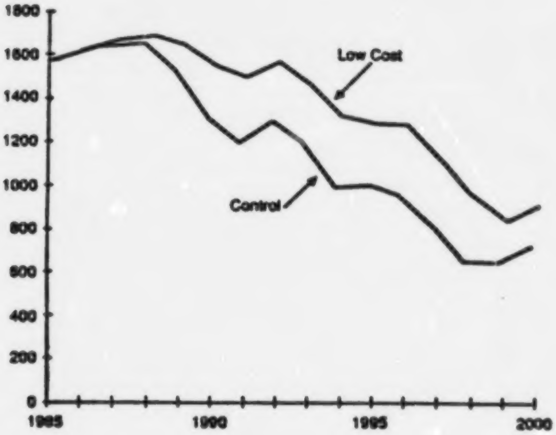
In Chapter 5 a detailed analysis is undertaken of the effects of new technology. From this analysis it is apparent that current plywood production costs typical of many B.C. mills can be reduced significantly. For the purposes of this simulation it was assumed that, over the next five years, new technologies will be implemented, and average plywood production costs reduced by about 10 per cent by 1991. The results from the model are shown in graph form in Figure 9 and the full details are presented in Appendix Table 4. Some of the principal conclusions from this simulation are:

- Shipments of plywood in Canada maintain a much higher level and do not start declining until the early/mid 1990's as shown in Figure 9.
- OSB shipments into the B.C./Alberta market are slightly lower from 1990 onwards than the control forecast.

Figure 9

PROJECTED PLYWOOD SHIPMENT TO CANADA

Thousand m³



SOURCE: RISI Control projection
RISI Low Cost projection

- There is, however, little change in shipments to the U.S. for OSB from B.C./Alberta even though U.S. plywood production costs are also reduced. It is assumed that if the Canadian plywood industry is to implement the new technologies, the U.S. would do the same. In fact, U.S. mills are in advance of Canadian mills in this implementation particularly in the South.
- The outlook for exports is improved substantially with significant additional volumes being exported during the 1990's amounting to 150/200,000 m^3 per year. The analysis undertaken earlier in Section 3 indicated that market existed for competitive supply on a reliable and continuous basis.

The 10 per cent reduction in production costs is a smaller decrease in cost than is discussed in Chapter 5. Consequently, it would be reasonable to suppose that if sheathing production costs can be reduced by more than 10 per cent, the plywood shipment volume would likely be somewhat higher.

The impact of assuming that companies invest in the new plywood technology and lower their production costs is very significant. Under this scenario, by 1995, the reduction in demand for plywood compared with current levels is decreased to 250,000 m^3 as against 600,000 m^3 in the control projection. Of even greater significance is the fact that the volume is maintained at current levels up to 1992/93.

There is a minor negative impact on western Canadian OSB shipments into B.C./Alberta delaying somewhat the time when additional capacity would be required.

It is important to recognize that this scenario is only likely to develop if money is invested in the plywood industry to install new technology. The likelihood of this investment occurring is discussed later.

2. Higher Exchange Rate Scenario

There is considerable uncertainty regarding the long term direction of the Canadian dollar. Clearly if the exchange rate decreases then Canadian products should become more competitive in other markets and the outlook for producers should be more favourable. There is some concern, however, over the likely impact of a strengthening dollar. Under this scenario, it is assumed that the exchange rate for the Canadian dollar moves to $0.90/U.S.$ by 1991 and is held at this level thereafter.

It is assumed that current tariffs continue and there is effectively no movement of plywood in either direction across the border.

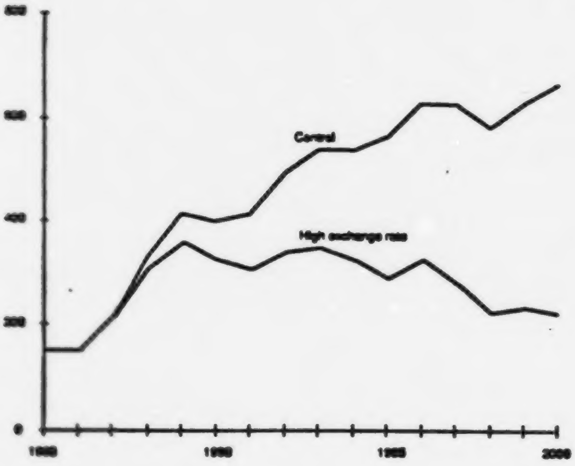
The principal impact is therefore on Canadian shipments of OSB/waferboard. These decline very substantially and there is a strong impact on OSB shipments from B.C. and Alberta. A comparison of the projections under this scenario against the control forecast is shown in Figure 10 and full details are presented in Appendix Table 5.

It is also of significance that the demand for OSB/waferboard in the U.S. west is not substantially altered by the reduction in imports from Canada. The model assumes that additional U.S. capacity will be installed.

It might be expected that with the substantial reduction in OSB/waferboard exports there would be greater pressure to penetrate the plywood sheathing market. The results of the computer simulation indicate that this pressure has little effect and plywood shipments remain very similar to the control projections. This result will confirm the view that market acceptance factors limit the penetration of OSB/waferboard.

Figure 10

OSB EXPORTS TO THE US WEST
FROM B.C./ALBERTA
Thousand m³



SOURCE: RISI Control projection
RISI High exchange rate scenario

The principal information gained from this scenario is that OSB/waferboard production in B.C./Alberta is very sensitive to movements in exchange rate. The corollary of the results obtained is that if the dollar weakens there should be more sales of OSB/waferboard to the U.S. West.

3. Zero Tariff Scenario

The control projection and the previous two simulations had assumed that the current tariff and non tariff barriers between the U.S. and Canada are maintained. A further analysis of these barriers is given in Chapter 7.

Under this zero tariff scenario it is assumed that tariffs for plywood in both directions U.S./Canada will be reduced to zero by 1990 over a two-year period. Furthermore, it is assumed that there will be no code or other non-tariff barriers and plywood manufactured in either country would be equally acceptable to U.S. and Canadian consumers.

The results of the computer simulation were somewhat surprising. Initially, the simulation was carried out using the control projection for exchange rate and it was found that the net trade between the countries was negligible. Some volumes of sanded move into Canada but these are effectively balanced by sheathing into the U.S. A second approach was taken whereby exchange rates were maintained at current levels, i.e. U.S.$.73/$1, throughout the period. This approach resulted in a rather more significant trade flow which is shown in Table 15.

Table 15

Cross Border Plywood Shipments - Zero Tariff
(thousand m^3)

	Sheathing to U.S.	Sanded to Canada	Net Trade
1991	30	10	20
92	95	25	70
93	55	20	35
94	90	10	80
1995	175	25	150
96	135	20	115
97	195	25	170
98	150	25	125
99	185	25	160
2000	240	35	205

Within the total context of the North American plywood volumes, these levels are very small. However, as a share of Canadian sheathing shipments they are reasonably significant and would provide additional sales to offset losses to waferboard/OSB. It must be emphasized, however, that this projection is based on a continuation of current exchange rates.

In view of the later analysis shown in Chapter 7, it might be expected that a zero tariff should have resulted in a greater trade flow. This increase has not occurred primarily due to the point to point transportation rates included in the computer model.

Transportation costs are a high proportion of delivered costs for plywood and therefore have a significant effect. These did not include, however, an analysis of the possible option of moving plywood by water from B.C. to the Atlantic Coast or possibly even to California. It would seem therefore that the impact of a zero tariff situation could be potentially greater than indicated under this simulation.

JUDGEMENTAL ANALYSIS

The econometric approach to the development of forecasts is generally accepted as being a valid and statistically reliable methodology. At the same time there are some limitations.

- The lack of specific historical data can make it difficult to develop detailed projections. This lack is particularly important regarding the market for sanded and specialty plywood in Canada.

- Traditional attitudes and specific demands by the consumers in particular end use areas have the result that structural panels are not necessarily interchangeable. Thus, even though OSB may be cheaper the demand for plywood continues.

It is apparent from the analysis earlier in Chapter 3 that there are significant volumes of sanded and specialty grades of plywood consumed in Canada. Estimates of current consumption suggest that these are over 90,000 m^3 in B.C./Alberta and around 210,000 m^3 in the rest of Canada.

These grades are consumed primarily in non residential construction, industrially and in general D-I-Y use. They are not therefore particularly sensitive to activity in residential construction. Projected activity in each of the sectors of importance was shown to be at least as strong, if not stronger, than in the U.S. At the same time the RISI model for the U.S., where historical data has permitted projections for sanded, indicates that the consumption of sanded plywood remains stable (see Figure 8 and Appendix Table 3).

It would therefore appear reasonable to believe that the same pattern should hold true for Canada. Consequently, the current estimates of consumption levels for sanded and specialty plywoods should be maintained for the future.

The question of sheathing consumption remains. The market analyses of Ontario and Quebec indicated that, despite the long term presence of waferboard in the market and even though substantial price differentials existed between sheathing plywood and waferboard, plywood still retains a significant market share. This share is partly the result of tradition and partly because waferboard in Ontario and Quebec has been a lower quality than the new OSB boards being produced in western Canada.

In the RISI control forecast projections for the rest of Canada, plywood consumption in total is expected to remain reasonably static for the next two to three years and only thereafter to commence a fairly rapid decline.

An alternative scenario, assuming that sanded/specialty plywood at least maintain their levels and sheathing continues to retain some share, albeit declining, would suggest that plywood shipments to the east could be significantly higher than forecast.

In B.C. and Alberta it would also appear that a reasonable alternative scenario could exist which would result in a lower level of penetration by OSB in residential construction. Current consumer reaction at the large builder level indicates that OSB is very acceptable and it is likely that it will quickly reach a high level of penetration. There are, however, many other uses of plywood and, in the Vancouver area in particular, the significance of large tract builders is much less than in other parts of Canada.

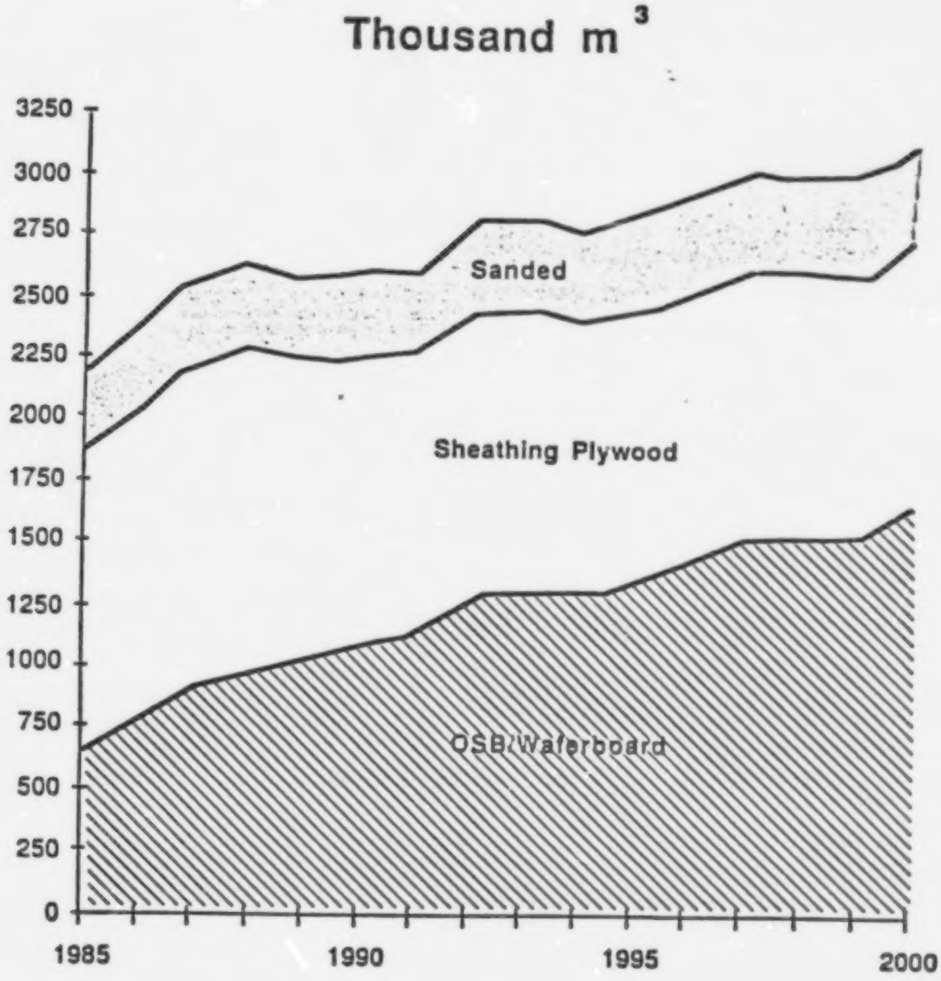
This alternative scenario for Canada would indicate the outlook for Canadian structural board shipments shown in Figure 11. The full details of the projection are shown in Appendix Table 6. The concepts used in the development of these projections were as follows:

- The consumption of sanded and specialty plywood will remain relatively static as a share of the total market. If plywood producers are successful in adopting a more consumer oriented approach to the production of a wide variety of specialty products, this projection could be overly conservative.
- The total structural board demand is maintained as in the RISI control projection both for B.C./Alberta and Canada in total.
- Sheathing plywood production in B.C. will be more competitive as a result of modernization.
- The RISI projections for OSB/waferboard penetration into B.C./Alberta are maintained up to 1990 and for the rest of Canada up to 1988. The levels of penetration allowed are as follows:

	B.C./ Alberta	Rest of Canada
	per cent	
1985	17	40
86	18	45
87	21	47
88	27	47
89	33	49
1990	40	50
1995	54	52
2000	63	58

Figure 11

CANADIAN STRUCTURAL BOARD DEMAND - JUDGEMENTAL APPROACH



SOURCE: Appendix Table 6

The total penetration in B.C./Alberta in the long term is expected to be greater than in the rest of Canada. A significant share of the demand for structural panels in central Canada is in a great variety of industrial uses where the recent market survey showed that plywood is still preferred despite large price differentials. In B.C./Alberta the significance of industrial demand is less and housing construction accounts for a large share of structural board usage.

The result of this approach indicates that the demand for plywood within Canada should not drop as drastically as projected by the RISI control forecast. Though there is still some decline this would be principally in the consumption of sheathing in B.C./Alberta. At the same time the growth in OSB/waferboard consumption in later years is at a slightly lower rate than projected earlier.

The impact on the B.C. plywood industry of these supply/demand projections are as follows:

1. The demand for plywood, which currently is principally produced in B.C. and Alberta, will remain relatively static. The 1985 level was around 1,570,000m^3 according to RISI. This level is projected to rise by about 130,000 m^3 by 1988 but to decline slowly thereafter to around 1,500,000m^3 by the late 1990's.

2. The volume of sanded and specialties is expected to increase annually by about 1.5 per cent. This increase is in line with the growth projected for non residential construction since much of the current use of this type of plywood relates to concrete form. No account has been taken of the potential to expand the development of specialty panels.

3. Substantial reductions in plywood sheathing sales to the B.C. and Alberta markets are projected by the early 1990's.

4. The volumes of OSB to be sold into the B.C. and Alberta market will increase substantially but represent a comparatively small proportion of the capacity expected to be installed by 1987.

   In 1990, for example, B.C. and Alberta consumption of OSB is expected to reach around 230,000m^3. This level is only 30 per cent of capacity and is the same as projected in the RISI control forecast.

In summary, the outlook for plywood production in B.C./Alberta under this judgemental approach is for relatively slight decline in comparison with the RISI control projection.

In addition to re-evaluating the results provided from the computer model for plywood, it is also worthwhile analyzing the outlook for OSB/waferboard. The RISI scenarios indicate that domestic Canadian demand for OSB/waferboard produced in B.C./Alberta is a relatively small proportion of capacity (installed and currently planned). By 1990, for example, domestic shipments will be only 30 per cent of capacity. Export shipments to the U.S. West are therefore critical.

The RISI projections for OSB/waferboard appear to be somewhat pessimistic. Penetration by OSB/waferboard in U.S. West is projected at levels very substantially below penetration in the rest of the U.S.

Even given the tradition of plywood in the region and the transportation advantage to the local plywood industry, the rate of penetration projected seems very low. The market size in the west is so large that even a

Table 16

OSB/Waferboard Penetration
% of Total Structural Board

	U.S. West	Other U.S.
1985	8	16
86	11	18
87	15	22
88	17	24
89	17	30
1990	17	36
91	20	42
92	21	42
93	23	45
94	25	49

Source: RISI Control forecast

relatively small increase of an additional three percentage points in terms of penetration is equivalent to a new plant with the capacity of the Dawson Creek operation.

Consequently, though the control projections suggest there is little opportunity for expansion in OSB/waferboard capacity in B.C., they may be unduly pessimistic.

Conclusion

The overall outlook in North America is for some marginal growth in the demand for structural panels. The outlook for B.C. in terms of plywood and OSB production is not easy to predict and depends on the most probable outcome of a number of factors:

- likely investment in the plywood industry to modernize;
- the changes in plywood production cost that could result from modernization;
- tariff changes;
- exchange rates;
- OSB/waferboard acceptance at a consumer level in Canada and the U.S. West;
- the development of specialty plywood or other specialty products linked to the plywood industry.

In order to develop an indication of the most probable scenario for the B.C. panelboard industry, it is necessary to examine some of these factors in greater depth. The next three chapters are devoted to a more extensive examination of these factors. The most probable scenario is developed in Chapter 8 together with an analysis of the potential development of the B.C. panelboard industry.

5

THE IMPACT OF NEW TECHNOLOGY ON PRODUCTION COSTS

Introduction

The sensitivity analysis undertaken in Chapter 4 indicated that production costs play an important part in the outlook for structural panels. In the following chapter the impact of new technology is discussed in some depth for waferboard/OSB and for plywood.

Waferboard

Technological developments have had a fundamental impact on structural panel products. The principal of these has been the development of a panel, waferboard, which can be used for exterior structural purposes and is made from reconstituted fibre. The major aspects which made this development so significant are:

- the quality of the fibre input is relatively unimportant therefore underutilized low cost resources are suitable;
- a high proportion of the raw material input can be converted into finished product;
- the production process allows for a high degree of automation and therefore a relatively low labour content;
- the product is suitable for a variety of uses.

The second stage of development of this product has been a relatively minor change where the raw material is cut into strands, rather than wafers, and oriented - Oriented Strand Board (OSB). OSB has all the advantages of waferboard but results in a panel that is stronger.

Since this technology is relatively new and the majority of plants have only been recently built, most facilities, in the U.S. in particular, have the current state-of-the-art technology.

There is, however, a further technological advance that may soon reach a commercial state of development. This new technology is Steam Injection Pressing.

G. Siempelkamp & Co. (SIMCO) of Krefeld, West Germany, under license from Weyerhaeuser Co. (Weyco), have perfected at a laboratory and pilot plant stage the process for steam injection and evacuation curing of reconstituted wood panel products (MDF, OSB, Waferboard, Particleboard and combinations of same), utilizing both standard urea formaldehyde and phenol formaldehyde resins.

In essence, the process allows for the high speed and uniform curing of panels of up to 2-1/2 inches thickness.

Typical press times for urea formaldehyde bonded panels under this process are:

Thickness (mm)	Press Time (seconds)
20	56
30	74
35	80
40	90
50	105
60	120

Press times for the conventional process are several times longer than for steam injection. At greater than about 40 mm thickness, the conventional press time tends to become so long that the quality of the board starts to deteriorate rapidly.

Panels produced under the steam injection process meet or exceed existing ANSI (American National Standards Institute) requirements. The panels also have an additional advantage with this process in that density is controllable and uniform across the panel width to +/- 5 per cent of target density.

Some of the implications and potential for this process include:

- ability to produce thick panels cost effectively, thereby allowing economic production of new products from reconstituted wood panels;
- ability to produce mixed product panels (e.g. with veneer faces and backs) using a single step process.

In addition to the above, the steam injection process will allow a plant to produce higher volumes of a better quality standard product OSB/waferboard, MDF, or particleboard) at a lower relative press cost. On the other hand, the press is more expensive.

It is difficult to foresee the impact of this new technology. It seems likely, however, that it may result in some totally new uses for reconstituted boards rather than increase the pressure of substitution for plywood.

Plywood

The situation in the plywood industry is very different. The majority of mills that exist were originally built before the mid 1970's - some are 20 to 30 years old. Many are still using essentially the same equipment and production processes that were in the original construction. Yet in recent years there have been a number of technological advances developed mainly by the equipment suppliers. Some of the most promising developments are as follows:

Spindleless Lathe

Veneer recovery factors of greater than 60 per cent (as opposed to 35 to 40 per cent in conventional mills) in the 6" to 12" log diameter range have been achieved with the spindleless type of lathe. Depending on harvesting and transportation costs, it is estimated that the use of this equipment could reduce wood costs by up to $25/m^3$, mainly through higher recovery and the ability to use selected low cost pulp wood. This combination of higher recoveries and lower wood costs will allow plywood to become much more competitive with OSB/Waferboard. A capital investment of approximately $1,500,000 could be paid off in less than a year, depending on present wood costs and recovery factors.

The original prototype spindleless lathe has been in regular operation for about a year in a plant in Texas, handling maximum 8" diameter blocks. The manufacturer is in the process of completing a redesign of the equipment and the new prototype, capable of handling up to 14" diameter blocks, should be ready for operation soon.

The advantage of a spindleless lathe will stem from its ability to get very high recovery from small diameter wood by peeling cores to 1-15/16" diameter without the use of spindles. The lathe will hold the nominal 8 ft. long block of wood between three driven full length rolls. A fixed knife will be located near the top roll. The two lower rolls will move upwards towards the fixed top roll as the veneer is rotated and cut.

The lathe will be gravity-fed and will accept blocks which are rounded to 50 per cent of their surface area. To accomplish this, the blocks will be fed to a roundup lathe prior to peeling into veneer in the spindleless lathe. The roundup lathe will be similar to spindleless lathe in concept, except that the rolls will be larger and not full length. This process will enable the equipment to handle the rough 8 ft. blocks and round them up. Low grade pulp wood blocks which can be rounded to 50 per cent of surface area will be suitable. The roundup and spindleless lathes will be designed to handle up to 16 blocks per minute with a maximum block diameter of 14". The round up waste veneer is recovered as chips.

The equipment will eliminate the need for an X-Y scanner, lathe charger, spindle type lathe, backup rolls, knife carriage feed works and the DC lathe drive.

Other Lathe Advances

In addition to the spindleless lathe, there have been other developments such as the power back roll and the power nose bar. These developments also allow the log to be peeled down to cores of very small diameter. Consequently, the ability to radically improve veneer recovery and to utilize logs of a much smaller diameter than traditionally acceptable is not limited to the spindleless lathe. However, these other approaches would not allow the mill to handle logs with centre rot and, as yet, they do not peel down to 1 15/16" diameter possible with the spindleless lathe.

Rotary Clipper

The rotary clipper was introduced to the market in 1980, and has gained wide industry acceptance over the last five years, with about 50 units installed in the U.S.A. So far, seven units have been installed in British Columbia.

This equipment can increase production by 15 to 20 per cent when installed in an existing veneer line equipped with an efficient lathe, tray system, diverter and stackers which can utilize its productive capacity. The clipper is no longer a limiting factor to production, allowing a potential profit of $300,000 to $400,000 per year or a payback on the investment in less than a year. In addition, the rotary clipper can increase recovery by 1 to 2 per cent through high clip accuracy, resulting in potential savings of $40,000 to $50,000 per year.

Two Deck Catch-Up

This equipment is used to minimize the time when there is no veneer under the clipper knife. It is required as a result of installing a rotary clipper and allows a mill to utilize the full capacity of the clipper.

Dry Veneer Stackers

Dry veneer stackers have been installed in four plywood plants in the United States, but so far none have been installed in plants in British Columbia. This stacking system requires only one operator to grade veneer as it leaves the dryer. The systems range from a single bin module up to multiples of modules to suit the grading requirements of the mill.

Based on a 6 bin dry veneer stacking system, labour savings of $240,000 per year can provide a pay back of the investment in a little over one year.

Foamed Glue

Sixteen foamed glue applications systems have been installed in plywood plants in the United States. It is only very recently that the first has been installed in B.C.

The manufacturer claims that the reduction of glue spread rate will save more than 25 per cent on glue usage. This saving is a result of better controllability of glue spread due to the precise method of application, i.e. no over spray or over spread. The system is used in conjunction with an automated lay up line.

A royalty of $0.13 per 1,000 sq. ft. of single glue line must be paid to the equipment supplier and the purchaser must agree to buy the patented foaming additive from the supplier.

A net saving of 20 to 25 per cent in adhesive costs is a realistic possibility. This saving is equivalent to \$3 to \$4/m^3 and would equal some \$544,000 savings in glue costs per year. The pay back on the investment would be a little over one year.

Using full sheets of veneer trimmed to minimum length (99"), can result in a 2.5 to 3 per cent savings in veneer costs in addition to the above.

Automated Veneer Lay Up

Six semi or fully automatic veneer lay up lines have been installed in mills in British Columbia.

One of these mills which has a fully automatic line reports a pay back from labour savings alone in 1.5 years on a \$2.3 million expenditure.

Basically, an auto lay up line replaces the conventional glue spreader by feeding and conveying the sheets of veneer through the glue application unit automatically, thereby drastically reducing the amount of handling and labour which is inherent in a conventional glue spreader system.

It should be emphasized that the majority of the technologies referred to above are already in commercial use and are proven. There are, however, very few B.C. mills that have had the necessary capital to upgrade their facilities to include all the state of the art equipment. Indeed there are some mills with virtually state-of-the-art equipment particularly on the Coast.

A major problem, in addition to the lack of capital, has been the general concern about the plywood industry. The closure of a number of plywood mills together with the rapid growth in the capacity and production of reconstituted boards has meant that the senior management of most companies have been concerned that the plywood industry is rapidly becoming obsolete.

Analysis of current production costs of different types of board would certainly appear to confirm this view. In Table 17 the costs of production of plywood are compared with OSB for western Canada. It is clear that the costs for sanded plywood are very substantially in excess of the other panels primarily due to labour and the high cost of logs on the coast. Sanded plywood, however, is not meeting any substantial competition from OSB at this time. The properties of the products are sufficiently different that they tend to be suitable for different types of uses. These differences are discussed in more detail in Chapter 3. It is the comparison of sheathing plywood and OSB that is particularly significant.

Table 17

Comparison of 1986 Mill Production Costs
(Existing Mills)
Canadian Dollars per m^3

	Sanded Plywood	Sheathing Plywood	OSB/ Waferboard
Production Costs:			
- Wood (1)	140	70	36
- Resin	14	15	26
- Wax	-	-	3
- Fuel/Energy	13	10	9
Supplies	9	12	13
Labour	115	75	21
Administration and Overhead	22	15	10
Total Production Cost (2)	313	197	116

(1) Wood Cost Adjusted for Residue Income
(2) Depreciation, Sales and Financing Costs are excluded

It is evident that OSB/Waferboard has a very substantial advantage over sheathing plywood - wood and labour costs being the major components.

Even though OSB/waferboard sells at a discount to plywood the difference between $116 for OSB/waferboard and $197 for plywood is such that a plywood producer faces major problems - particularly bearing in mind that regular plywood sheathing is essentially a fairly low value commodity product.

It is apparent, therefore, that the pessimism with which plywood is viewed has been based on sound evidence. Consequently, companies have been very reluctant to sink new investment into an industry which is regarded as having so poor a future. As was pointed out earlier, only a few companies have put any substantial amount of capital into their plywood mills. Yet the potential impact of the new technologies is very substantial.

An analysis was carried out on the likely production costs of a mill utilizing all the new proven technologies that already exist, but have not been implemented. The costs of production developed by this analysis are shown in Table 18 and compared with the average costs of production at existing mills described earlier.

Table 18

Sheathing Plywood
Costs of Production
Current versus Potential
Cdn.$ per m^3

	Current[1]	**Potential[2]**
Wood	70	45
Resin	15	12
Fuel/Energy	10	9
Supplies	12	13
Labour	75	42
Administration and Overhead	15	18
Total	197	139

[1] From Table 17

[2] Based on the modifications discussed earlier and assuming the use of a spindleless lathe or other technological development allowing peeling to small diameter cores.

This cost level is a very substantial improvement on the average level quoted earlier and is much closer to the cost of production of OSB. The cost is, however, still 20 per cent higher than OSB costs. Thus, where the two panels compete directly with each other for any particular use plywood is at a disadvantage. This disadvantage is offset if the product must be moved any distance since OSB is much heavier and costs considerably more to transport.

In the course of this study the consultants checked with industry experts on this important conclusion regarding the impact of technology. Those with detailed knowledge of the most recent improvements confirmed the findings and some even stated that,in the future, sheathing plywood could be produced more cheaply than OSB.

In summary, the major factors that contribute to reduce the differential in production cost between sheathing plywood and waferboard/OSB are:

- high quality and expensive peeler logs are no longer necessary;
- higher yields from raw material are possible;
- more of the process can be mechanized thus reducing labour costs.

Wood Costs

An additional aspect worth noting is the possibility of changes in raw material costs for OSB. As was pointed out earlier, the original development of the product, or its predecessor, waferboard, was based on the availability of low cost underutilized fibre. In some areas, such as the North Central U.S., this availability is now fairly limited. The most economic supply is already committed and costs will inevitably increase.

In the U.S. South, though, there still remains a substantial volume of poor quality hardwood. Demand pressures are increasing, however, as a result of not only the new panelboard capacity but also demand from other users such as the pulp and paper industry. In the west, though there is still substantial fibre availability in Alberta and B.C., there is little underutilized low cost fibre in the coastal U.S. region and the volumes available in the Inland region are comparatively expensive. This aspect will be discussed in more depth in Chapter 4.

It should be noted, however, that the wood costs for plywood could also increase in B.C. if stumpage levels are raised. In percentage terms, the impact is not very great since at present stumpage represents less than 3 per cent of total production cost.

The conclusion that can be drawn of relevance to comparative production costs is that the overwhelming wood cost advantage that has favoured OSB in the past could well decline.

Investment

Lower production costs are only possible if a significant capital expenditures are made. To modernize the B.C. plywood industry to achieve these cost levels would involve a capital investment in the region of $100 million.

In the low cost scenario discussed earlier in Chapter 4 it was evident that, with modernization, the decline of the plywood industry could be slowed down. In order to identify whether this scenario is probable, the likelihood of companies investing in the industry must be examined.

Each of the technologies discussed showed very favourable returns on investment with short pay back periods. Theoretically, therefore, companies should be likely to make the necessary investment. Yet the facts presented are well known (certainly to the plywood mill managers) and many mills are still without much of the new technology.

As was commented earlier, it is believed that the failure to invest had been the result of a lack of confidence at a corporate management level in the future of plywood. This lack of confidence was particularly evident up to mid/end 1985. Since then, however, plywood mills have been showing substantial profits and there is strong evidence to support the belief that attitudes are changing. Companies tend to be secretive about their plans but the following facts are publicly known:

- Several companies have approved or have undertaken capital expenditures at their plywood mills in the last 18 months. Examples are Northwood, Weldwood and Evans.

- Equipment suppliers report a significant increase in enquiries for new plywood equipment.

- It is expected that the first spindleless lathe in B.C. will be in operation by mid 1987.

- A plywood consortium has been formed to fund a $270,000 study, with DRIE support, on the benefits of veneer incising.
- The plywood industry is, for the first time, now actively supporting a substantial R&D effort by Forintek on specialty panels.

As more and more mills modernize, the pressure on those remaining will become greater. Given the great variations that exist between mills and companies (mill conditions, company financial priorities, company strategy resource availability and so on) it is probable that some mills will not be modernized and will be forced, sooner or later, to close.

It should be emphasized that the B.C. plywood industry is not homogeneous. There are essentially two industries - one on the Coast and one in the Interior. The former suffers from very high log costs. Even with every technological advance, the coastal industry would find it difficult to compete in the sheathing market. The answer here could lie with the sanded market and an expansion of specialty products. These possibilities are discussed in the next chapter. The Interior industry, in contrast, has an excellent opportunity to compete with OSB/waferboard. Wood costs are low and the mills tend to be high volume operations. It is in this area specifically that modernization should take place to lower production costs for commodity sheathing.

The plywood industry has undergone a major structural change, resulting from the introduction of a competitive product. Market acceptance of waferboard/OSB accelerated during a period when consumption volumes were in a cyclical decline. The impact on plywood was, therefore, particularly severe. Less competitive operations closed and others rationalized their product mix. The survivors are now encouraged by improved profitability and a cyclical upswing in demand after the low volumes prevalent in the early 1980's. The economics of modernization are proven and the attitude towards the panelboard industry, at a corporate level, appears to be changing. At the same time, the needed investment is far from being approved and it is in this area that government initiatives could have some significant impact.

For the purpose of developing the most probable scenario it is assumed that the necessary investment will be forthcoming.

6

THE POTENTIAL FOR NEW PRODUCTS

Introduction

The future development of the plywood industry lies not only in its ability to compete in commodity products but also in its ability to become more consumer oriented and manufacture products that are better suited to consumer needs.

There are a number of different approaches that can be taken to the development of new products. The products can be in the form of relatively minor changes such as new thicknesses or lay ups to meet particular customer requirements. Alternatively, they can be overlays on a plywood substrate for concrete form or a variety of other uses. Other approaches can involve new manufacturing techniques such as laminated veneer lumber and parallel strand lumber.

Specialty Plywood

Revised Specifications

Plywood producers have tended to concentrate on the production of commodity products to a set of standard specifications in order to keep costs as low as possible. Yet there are some consumers who would be better served by customized specifications.

In addition, the adoption of a performance rating approach as opposed to product standards would permit mills to utilize variations of species and veneer thicknesses to produce products that meet the performance requirements. For example, as a result of the APA performance rating approach in the U.S., Southern plywood manufacturers now produce a 15/32 3 ply panel as a standard item instead of the traditional 5 ply 1/2". This new panel still performs, when properly applied, as well as the traditional panel.

This type of approach, concentrating more on what the panel is needed for than on a set of standard manufacturing specifications, could open up a number of opportunities for specialty products. However, to develop business of this type requires significant changes in management attitudes and controls, processing flow controls and sales approach. These are not easy and not necessarily compatible with the production of low cost commodity product. Nevertheless, mills that are finding it difficult to compete economically in the standard product lines are, of necessity, having to look at this type of development.

Specialty Plywoods

The specialty plywoods that have already been developed with increasing success by some companies have been with overlays. Plywoods for use in the construction of concrete formwork have been produced for some years and recent developments indicate that this market can be expanded further. To some extent the penetration is at the expense of sanded plywood but there is also the possibility to increase market share in competition with steel shuttering.

In addition, there are a number of other end uses where an overlaid product can compete, substituting for other types of material. Examples are highway and other signs, working surfaces, built-in furniture, truck decks and so on.

Several B.C. companies already produce, or can produce, these products and the variety of product lines designed for particular users has been expanding. Different lay ups using a variety of species for the substrate are being developed by some companies.

It is not possible within the limits of this analysis to quantify the market potential that may exist but the prospects appear encouraging. Furthermore, it is an area where OSB tends to be unsuitable due to the unevenness of the surface produced. It is worth noting in this connection that considerable efforts were made to develop an overlaid waferboard for concrete form. As yet the product has not proved successful in the market.

In the U.S. the specialty plywoods of greatest significance are sidings. These represent over 80 per cent of a specialty plywood market estimated at over 1.5 million m^3. Sidings in the form of panels have not been, however, very successful in Canada despite availability from various producers over the years. Though climatic conditions are somewhat more severe in Canada it is not clear why the product should not be acceptable to consumers. If, in spite of past difficulties, this product can be introduced again it could represent a sizable volume for B.C. producers. The competition would be with vinyl, aluminum and hardboard sidings in lower cost housing or with cedar in the more expensive housing.

Laminated Veneer Lumber (LVL)

The manufacture of LVL is essentially an extension of the plywood process. Veneer is peeled from the logs, clipped and dried. Glue is spread and the veneers are laid up. At this point the processes differ. The LVL line allows for the production of long lengths - up to 80' - manufactured in a single opening press as opposed to the multi opening 4'x8' press for plywood. After pressing, the panel is cut into various widths from 4" upward and to whatever length required. In addition, the thickness of the panel is greater with 1 1/2" being typical.

The cost of building a new LVL plant is $30/35 million which is a sizable investment. However, for a modification to an existing plywood plant the cost would be around $10 million. Where the alternative may be to close the plant and obtain little for the sale of used equipment, this investment could be economically attractive.

At present LVL is only produced at relatively few factories in North America. Trus-Joist Corporation first produced the product for use in its own facilities for the manufacturer of I-beams. This company still produces and consumes most of the LVL currently available in the North American market. However, other industries where strength to weight ratios and stability are important are using LVL in increasing volumes. The prefabricated housing and mobile home industries find LVL particularly valuable. Other uses such as scaffold planking, truck decking and utility structures also have significant potential.

Consumers are becoming increasingly aware of the economic value of properly engineered structures rather than the more traditional "over design" approach. This approach calls for a raw material that has much more closely defined physical characteristics. The development of the Mechanical Stress Rating (MSR) concept has successfully fulfilled part of this need and the rapid development of this market is sufficient proof of the changes in consumer approach. There are, however, limits to the strength values that can be obtained with solid lumber. As the designers wish to span greater distances or to use lumber of a smaller cross section they turn to steel. LVL provides a suitable alternative.

The proponents of LVL are convinced that the potential market volume is very large. In a recent study made available to the consultants by Durand-Raute it is argued that there are four major consumer market areas available to LVL:

- Conventional lumber products in wide widths, estimated at 13 per cent of the North American market;
- Structural lumber i.e. select structural grades and MSR lumber, estimated at 11 per cent of the market;
- Specialized end product manufacture (ladder stock, scaffold planking, etc.);
- Export market shipment.

The last two are difficult to quantify but on the basis of the first two alone, the size of the market sectors within which LVL can compete is substantial at over 10 billion board feet.

Production costs for LVL are estimated at $150/m^3 assuming that all the latest technology (e.g. spindleless lathes, rotary veneer chippers and so on) is utilized. This cost is equivalent to about $250 ($180 U.S.) per thousand board feet of actual lumber. This amount is substantially above the average costs for lumber production but the product that is produced is able to compete for much higher value end use sectors where lumber prices are governed by supply/demand factors rather than production costs. Thus, for example, whereas the FOB mill sales price for S-P-F 2x4 std/btr may be only U.S. $180/MFBM, specific long length 2x12 in a structural grade would tend to be double the price. It is in these end uses that LVL should be able to compete effectively.

The LVL line can also be used to produce plywood in a variety of lengths. It is claimed by the equipment manufacturers that the production costs are comparable with conventional plywood technology.

It should be emphasized, however, that given the higher costs of production, there are limits to the potential penetration of LVL into the 10 billion board foot market described earlier. At present, the majority of lumber users are constrained in their design approach by the raw material available to them. For LVL to expand dramatically their approach will have to change. This expansion is certainly possible and the greater concentration on engineered structures both for residential and non residential uses indicates a trend that would favour the manufacturer of LVL.

In summary, therefore, the potential for development of the plywood industry into the production of LVL appears favourable. Competition will be with non wood products and with other technologies in the forest industry such as finger jointed wide width lumber, laminated beams, I-beams and so on. Competition from the regular production of wide widths in long lengths by sawmills is expected to show some decline over the years as the availability of old growth large trees becomes reduced.

Reconstituted Lumber

Of relevance to the plywood industry since it provides a high value use for the significant volume of veneer that is peeled from the log but unusable for plywood is a new product developed by MacMillan Bloedel. This product, parallel strand lumber (PSL), has the registered name of Parallam and offers designers a product with predictable physical characteristics. It is claimed to be one of the strongest wood based building materials in the world and is available in a variety of sizes of almost unlimited length.

The waste veneer is prepared into knot free strands of up to 8 feet in length, coated with resin and formed into a continuous mat which is then pressed and cured, using microwaves, into a beam of the desired size.

As yet production is limited to the output of a pilot plant but commercial development is under active consideration. A substantial volume, about 450,000 board feet, was used in pavilions at Expo. Little information has been released on production or capital costs but it appears inevitable that these will be substantially higher than normal lumber. Consequently it will not be competing in the same uses and will be marketed as an engineered product for specialty uses and designs. Though the competition will be partly with steel it will, in addition, compete with LVL which is also aimed at these specialty uses.

In this context, it is also relevant to note one other new product that is reaching a commercial stage of development. Australian researchers have developed a product known as SCRIMBER. This product uses, as its input, small trees and thinnings from the forest. After removal of the bark the stems are crushed by a series of rolls in a "scrimming mill" which produce bundles of interconnected and aligned strands. They are dried and coated with resin before being pressed into the desired size of beam.

This product is not of immediate relevance to the plywood industry since it is not related to the production of veneers. It is however a potential competitor in the specialty high strength end use sectors and is therefore worth noting.

Conclusions

It has been evident for some time that consumers are becoming much more specific in their demands. This trend has become apparent in all industries and the forest industry is no exception. Consumers are no longer content to adjust their methods to fit the standard product lines of the manufacturers. This change offers an outstanding opportunity to the manufacturer capable of flexibility in production and management thinking - particularly the manufacturer who is finding it difficult to compete as a low cost producer of commodities.

It is, therefore, in this area that the B.C. plywood industry has the potential to change and grow. The coastal plywood industry has already moved to reduce to a minimum the production of regular sheathing and to maximize the more specialized products - sanded and specialties. Subsequent developments could include special lay ups - whether marginal or radical such as LVL - other overlays or, even, more profitable uses of waste such as PSL.

The impact, therefore, of lower cost alternative products such as OSB, though severe, need not necessarily be terminal to the plywood industry. It is clear however that considerable efforts and costs will be involved.

Research and development, marketing initiatives and capital cost for plant modifications are all necessary. Unfortunately, however, the plywood sector has been regarded as having a poor future and corporate management has tended to allocate a higher priority to other sectors. Therefore, the investment needed for a concentrated effort on the development of the many specialty product line opportunities has been constrained to relatively few companies.

The probable development of the industry in the direction of specialty products is difficult to predict. Specialty lay ups and overlays could offer good opportunity to extend the life of the coastal mills. Though log costs are high the physical characteristics of the logs available favour the production of an improved, and therefore higher value, product (e.g. Douglas fir). Unfortunately many of the specific market niches are small and the suitable modification of a mill can mean significant downsizing of the operation (in volume terms). For example, one coastal mill that now concentrates on specialty products has reduced output to one third of earlier capacity. The particular circumstances of this mill dictated this change but it is nevertheless an indication that a smaller scale is involved.

The particular difficulty in projecting development of specialty plywoods is that a large number of market niches are involved, each with specific needs. A great deal of research work is required to identify these needs and to develop products that can satisfy them. Conceptually the potential exists, but whether it will be realized will depend on economics. It will also depend on a commitment to strong marketing initiatives and a much greater sales effort than is involved in the traditional commodity products of the B.C. industry.

The past record of the forest industry would suggest that the commitment of the necessary effort and funds to the development of specialty plywoods will be limited to a few companies. Consequently, in the absence of any specific impetus or breakthrough, there is unlikely to be any spectacular growth in the production of specialty plywoods. The type of impetus needed would be some clear demonstration that money can be made in some new market niches with particular products. This impetus might come from the proven success of some company, from promotional efforts by a manufacturer of an overlay or from a research effort (technical and marketing) by government.

The development of LVL facilities in B.C. is also very difficult to project. The equipment is available and the economics appear, on paper, to be favourable. However, apart from some specialty in house uses, the product has no "track record" in the marketplace. This is inevitable for any new product and in a tradition oriented environment such as the forest industry there is always a reluctance to be first to take on the problems of developing the market. Once the first company has shown the technology and the product to be successful others are likely to follow but, as far as it is publicly known, there are no B.C. companies that are actively planning the installation of an LVL plant.

It is the consultants' belief that LVL lines will be installed in B.C. but it must be emphasized that there is no evidence to support this belief. The judgement is based on the following:

- the technology exists;
- the product can be produced economically;
- a modified plywood plant would involve a relatively small investment cost (compared with a greenfield operation);
- the consumers are becoming increasingly interested in wood products with well defined strength characteristics;
- the operation can have the safety valve of producing plywood;
- there are many elements in an LVL line which are common to a plywood plant.

It is possible that the impetus may have to come from outside the forest industry e.g. the equipment suppliers. As an analogy, the development of the very large treated lumber market initiated with the sellers of the chemicals; the development of roof trusses came from the manufacturers of the metal fasteners; even the development of MSR lumber resulted from the joint efforts of one forest industry company together with the manufacturers of stress rating equipment.

Assuming the development does occur it would seem unlikely that the first small facility, perhaps only 20,000 m^3 capacity, would be in place before 1989. Subject to its proven success others should follow in the early 1990's.

7

THE IMPACT OF TARIFFS ON TRADE

Introduction

For many years the level of shipments to export markets has averaged around 22 per cent of total plywood shipments. The volumes to export markets have been constrained partly by tariffs but mainly by the emphasis placed on the domestic market by producers. As pointed out earlier in Chapter 3 there appears to be long term potential for growth in export. This possibility is supported by the indications of potential volume under the low cost scenario in Chapter 4. It is possible, therefore, that any restrictions caused by tariffs will be of greater significance.

Tariffs between the U.S. and Canada are high and in most years result in minimal movement across the border in either direction. Changes in tariffs could have an impact.

EEC

The largest export markets for B.C. plywood are in Europe, principally the United Kingdom though other members of the European Economic Community take significant volumes. In total, the EEC accounts for 90 per cent of all exports of coniferous plywood from British Columbia. Therefore, tariffs, and the way they are applied in the EEC, constrain, and to some extent control, the export activities of plywood shippers in B.C.

There are no tariff restrictions on trade between members of the Common Market. Therefore, membership in the EEC requires that all member states maintain a common external tariff in order to prevent any member country becoming a channel providing easy access to the entire EEC.

The United Kingdom has always been the largest export market for coniferous plywood from British Columbia. A substantial market was developed in that country at a time when Canadian plywood was allowed duty free entry under the Commonwealth Scheme of Preferences.

When the United Kingdom decided to enter the Common Market, coniferous plywood was established as an important construction and industrial material and the U.K. wished to retain duty free status for this plywood from Canada.

The members of the EEC opposed the U.K. position and argued that the U.K. should apply the existing EEC plywood tariffs. Concerted efforts by the B.C. industry, the U.K. trade and Canadian government negotiators convinced them that the EEC would benefit from freer entry of coniferous plywood.

A duty free quota was negotiated but in order to protect some EEC hardwood plywood producers, the duty free quota was restricted to unsanded coniferous plywood thicker than 8.5 mm and sanded coniferous plywood thicker than 18.5 mm. Plywood not meeting these criteria is subject to the full duty as are imports in excess of the quota.

Initially, a duty free quota of 400,000 cubic metres was established to be allocated, each year, to the member states. Imports always exceeded the quota but duties were not collected on imports in excess of the quota until France, which had always opposed the quota and any extension of the quota, insisted that the duty free quota be bound under GATT and set at 600,000 cubic metres. In addition, France insisted that duty be collected on all imports in excess of the quota.

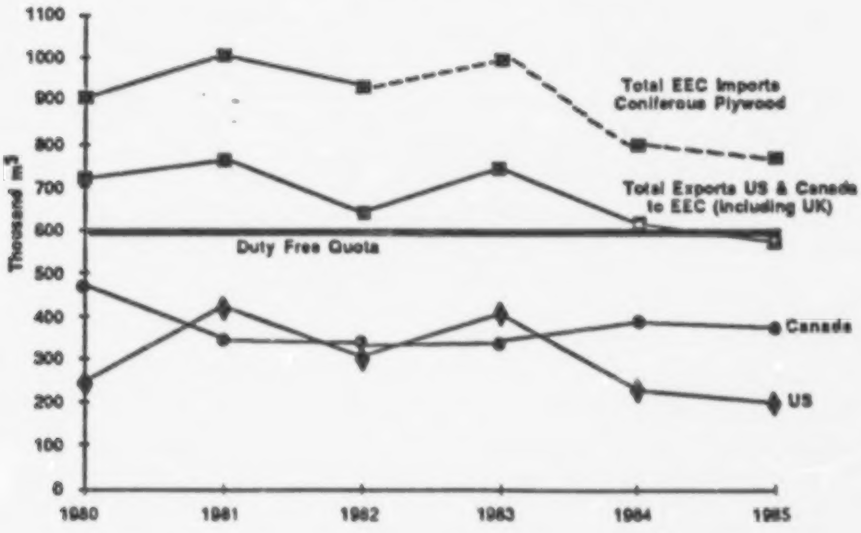
Under existing GATT agreements, the EEC common external tariff against coniferous plywood imports in excess of quota and plywood not meeting the restrictions quoted above has been reducing to the fixed level shown for 1986:

1981	12.3 per cent
82	11.9
83	11.5
84	11.1
85	10.8
86	10.4

Total EEC imports of coniferous plywood have always exceeded the quota, in fact, North American shipments alone have usually more than satisfied quota requirements except as shown in Figure 12. The other countries supplying coniferous plywood are USSR, Brazil, Hungary and other Eastern European countries.

Figure 12

EEC IMPORTS OF CONIFEROUS PLYWOOD
1980-1985



The allocation of the quota has remained relatively constant for the past four years. The shares for 1986 are:

Table 19

EEC Quota Allocation
1986
Coniferous Plywood as per EEC 3672/85
m^3

Benelux	152,695
Denmark	64,490
Germany	93,220
Greece	50
France	10,915
Ireland	8,850
Italy	23,780
United Kingdom	236,000
Reserve	10,000
Total	600,000

Though the U.S.A. is Canada's principal competition in the EEC, there is a common interest in any future negotiations to obtain:

- duty free access for all imports of coniferous plywood;
- a substantially enlarged duty free quota combined with reduced tariff levels;
- removal of all quota restrictions combined with a very low rate of duty on all imports.

Exports are essential to the B.C. plywood industry and the B.C. and federal governments should ensure that this subject is assigned a high priority in future GATT negotiations. Some important arguments are:

- An open-ended quota is easier to administer and more equitable. It would prevent some EEC countries from seeking a high quota allocation then re exporting to other EEC countries.

- As the number of members in the EEC increases, it is not equitable to maintain the quota at 600,000 cubic metres and split it amongst more countries.

- Disruptions to normal trade patterns result from the rush to obtain duty free quota plywood before the quota runs out.

- The original definition of coniferous plywood eligible for duty free quota treatment is no longer appropriate since supply/demand patterns have changed therefore further processed products and thinner thicknesses of sanded plywood should be admitted duty free.

Another negative aspect of the quota is the distortion it causes to normal trading patterns. Importers try to concentrate deliveries of plywood early in the year in order to take advantage of the quota and enter as much of their annual requirements as possible free from duty.

The quota is usually exhausted by mid year and orders decline. If an importer has over-bought, customers are sought in other EEC countries where sales can be made without duty restrictions, further distorting markets.

Freer access to the EEC is an obvious and desirable goal. However, in the absence of major concessions by the EEC, there are some shippers who are of the opinion that the concentration of export business early in the year is advantageous and offsets the disruption caused by the quota because Canadian consumption is relatively low in the winter months and there is more available for export. The experience of other shippers has convinced them that the removal of the quota and the substitution of a lower rate of duty on all imports throughout the year would rationalize trading and increase exports. These opposing viewpoints need analysis and the best approach should be defined by industry.

Administrative modification of the quota would have to be a fall back position from the more desirable objectives listed earlier. However, it is essential that government is given a clear directive from industry on which approach should be pursued.

Japan

Japan is a significant export market which has potential for further growth. The tariff is in the process of being reduced to 10 per cent by 1988. Further reduction would assist sales but market development in Japan has been and will continue to be a slow process requiring a gradual buildup of knowledge about coniferous plywood and its uses.

U.S.A.

There is currently a disparity in the tariffs on coniferous plywood entering U.S.A. from Canada and entering Canada from U.S.A. The U.S. duty is 20 per cent ad valorem while the Canadian duty is 15 per cent ad valorem.

There is no justification for this difference and the primary objective of any Canadian negotiations on this item should be to bring about the equalization of rates of duty in the shortest practical period.

These rates have been effective for many years. At the last GATT round of negotiations it was agreed that the U.S. and Canada should reduce tariffs to a relatively low level by 1988. Prior to this occurring a harmonization of standards was required in order to put the industries on both sides of the border on an equal footing. A committee was formed but there has been little real drive, apparently from either side, to reach any agreement and not much progress has resulted.

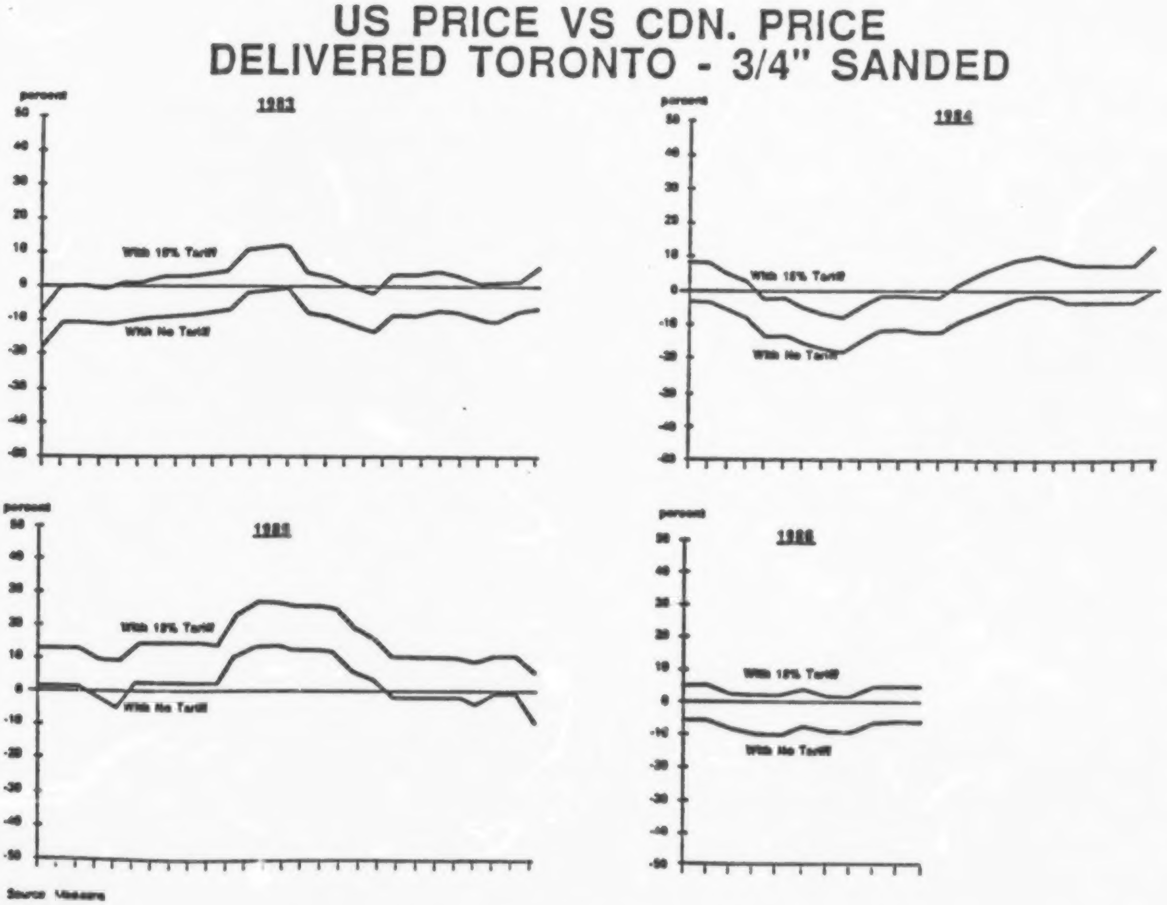
The impact of tariffs on trade between the U.S. and Canada in plywood is so substantial that very little product moves in either direction across the border. There has, therefore, been no very close relationship between plywood prices in the U.S. and Canada.

A comparison of prices over the past four years for delivery to a single destination in Canada - Toronto - was undertaken for sheathing and sanded plywood. This comparison is undertaken on a weekly basis by Madison's to show how Canadian levels relate to U.S. levels each week assuming that all taxes are paid. A further calculation to show the comparison if the 15 per cent duty did not apply was carried out.

The results are shown in Figures 13 and 14 for sanded plywood (3/4" AC versus GIS) and regular sheathing (3/8" CDX Douglas fir versus CSP) respectively. The figures show the difference in percentage terms between U.S. prices and Canadian prices with and without tariff.

For sanded plywood (Figure 13) it can be seen that, with the tariff, U.S. prices have been both above and below the Canadian levels. Currently they are close to the same price. However, if the tariff was removed, at most times throughout the last four years U.S. suppliers would have been able to sell at a lower price into Canada. Conversely, even if there was no tariff into the U.S., Canadian suppliers would have had difficulty competing in U.S. markets.

Figure 13

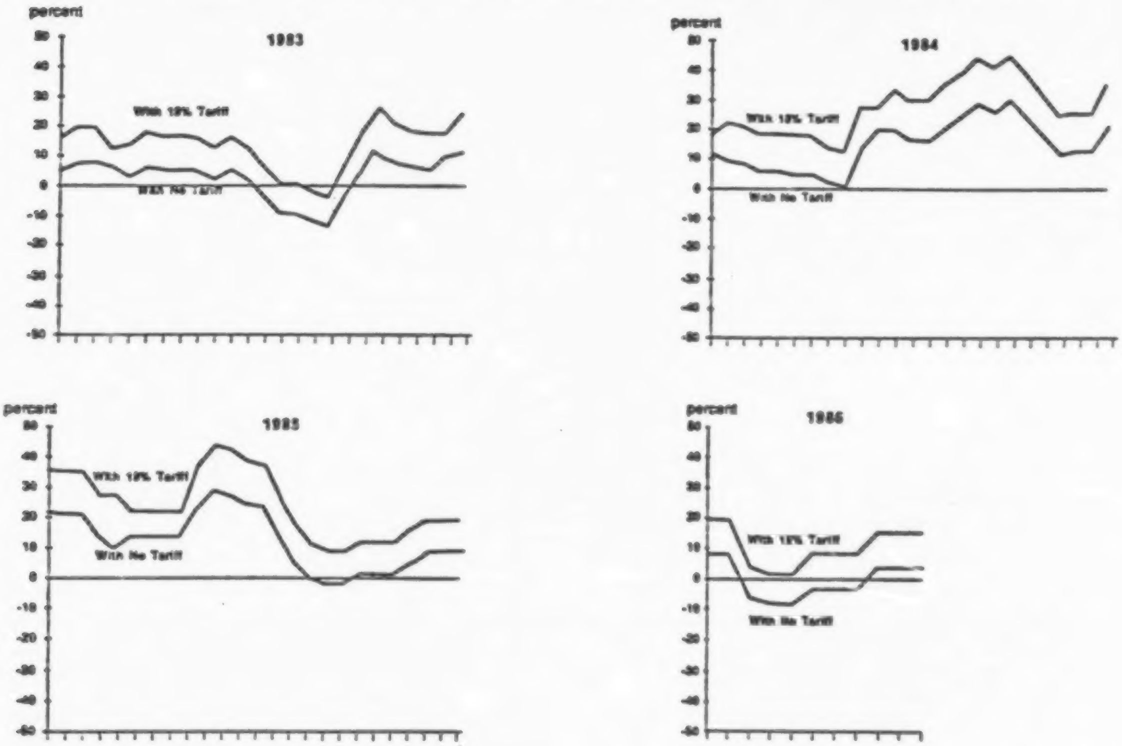

US PRICE VS CDN. PRICE
DELIVERED TORONTO - 3/4" SANDED

Source: Madisons

The situation for sheathing (Figure 14) is very different. With the tariff in place, U.S. supplies have almost always been more expensive. Even without the tariff, Canadian suppliers would usually have sold at lower levels because of the severe competition faced by Canadian plywood manufacturers from waferboard.

Figure 14

US PRICE VS CDN. PRICE
DELIVERED TORONTO - 3/8" SHEATHING



Source: Madisons

The implications of this analysis are twofold. First, as discussed above, the threat to Canadian suppliers from U.S. supplies of sanded is significant and returns would likely drop if free trade existed. On the other hand, given lower returns, the potential volumes would be much greater. Second, it would appear, in principle, that Canadian suppliers could be competitive in the U.S. market with regular sheathing. However, this comparison has considered the price of sheathing plywood from the U.S. West Coast compared with Canadian West Coast supplies both to an eastern point - Toronto. It can be expected that supplies of sheathing plywood from the U.S. South would land at eastern points somewhat more cheaply. Nevertheless, the analysis of U.S. CDX shipments carried out by the APA shows significant sales of Western plywood into some eastern markets. For example over one third of the CDX plywood consumption in Boston and about 25 per cent of the consumption in New York/Baltimore/Philadelphia/Washington is supplied from the West. The utilization of cheaper water transportation from B.C. to these areas could provide a competitive method of accessing these markets.

The results of the zero tariff scenario presented in Chapter 4 indicated that if tariffs are reduced to zero, there would be some advantage, albeit small, to the Canadian industry. This advantage would be to mills producing sheathing (Interior mills), whereas the Coastal mills producing sanded would face increased competition.

Discussions with industry on the merits of a tariff reduction have indicated some divergence of opinion. There is one school of thought that believes the expansion of market opportunity for the sale of sheathing (the product principally threatened by OSB) is very attractive. Others however, fear the likely reduction of sanded prices together with the overwhelming size of the U.S. industry - ten times the Canadian industry - would create a very adverse situation. The particular fear is that the U.S. industry could use the Canadian market as a balancing factor to compensate for fluctuations in the U.S. market, creating substantial instability in the smaller Canadian market.

There are, of course, regulatory mechanisms under GATT which are intended to limit the impact of 'dumping' but it must be recognized that some problems could arise. The advantages or disadvantages of establishing a free or freer trade situation are not clear cut. The current stumbling block related to differences in standards and building codes has to be removed before any action can be taken. These differences have existed for many years and very little real action is being taken despite the agreement reached in the previous round of GATT. It would appear that little will happen until the Canadian industry becomes firmly committed to the belief that elimination or reduction of tariffs are desirable. In the meantime, the reduction of the U.S. tariff down to the Canadian level is obviously desirable but comparatively insignificant.

Tariffs on Canadian exports of OSB/waferboard to the U.S. have been reduced to four per cent in 1987 as a result of the last GATT round. Clearly, the elimination or reduction of this tariff would marginally improve the ability of Canadian mills to compete with U.S. producers. However, it is not believed that the tariff has any significant impact on trade since even the higher levels that prevailed in earlier years did not appear to result in substantial constraints to shipments to the U.S.

It must be recognized, however, that the imposition of swingeing duties, as in the case of shingles/shakes, would inevitably have a detrimental effect.

Conclusions

The outlook for plywood under whichever scenario is considered is such that an expansion of exports is desirable. An improved tariff situation in the EEC will benefit an increased export effort from B.C. Since it is only governments that negotiate tariffs, government intervention is essential in this area. Indeed, there is the danger that without a strong Canadian (and U.S.) approach at the next GATT round the situation could worsen. It is obviously difficult to predict the outcome of the next round of GATT negotiations but it is hoped that there should be some tariff reductions and a rationalization of the current system. These changes, combined with more pressure on exports, should result in greater volumes.

It is believed that the situation regarding U.S./Canada tariffs is unlikely to change unless one or other government makes some strong commitment to overcome the current situation. In all reality it must be recognized that the point at issue is not really 'harmonization' of U.S. and Canadian standards and building codes but the change of Canadian regulations to meet those of the U.S. Thus, unless the Canadian government takes the initiative, nothing is likely to change. For the U.S. government to demand the change it would need to take a very strong line and be very convinced it was in the interests of the U.S. industry. There is little indication at present that such pressure is likely.

There may well be discussions between the B.C. industry and government on this subject to which the consultants are not privy. In the absence of this knowledge it is believed that the current situation will continue until the next round of GATT at whicn time there will be a substantial reduction in tariffs to apply in the early/mid 1990's.

The move towards a performance standard in Canada should develop the necessary framework whereby the products of the U.S. or Canadian industries are acceptable in either country. Though this standard is to be formulated by the end of 1987, it may be some time before the necessary changes are achieved at the consumer level.

8

THE POTENTIAL DEVELOPMENT OF THE B.C. PANELBOARD INDUSTRY

Introduction

The principal purpose of all the analysis so far in this report has been to develop and evaluate as much information as possible in order to project a "most probable" scenario for the B.C. panelboard industry. RISI developed a control projection for the B.C./Alberta industry based on the macro economic outlook, demand projections and production costs for different types of board. Simulations were also run to analyze the impact of some important variables. In addition, a further scenario was developed using the RISI demand projections but taking a more judgemental approach to consumer needs and preferences. The potential for lower production costs, the development of specialty products and the likelihood of changes in tariffs all have an influence on what can be regarded as the most probable scenario.

The Most Probable Scenario

Assumptions

The following assumptions, based on the analyses carried out earlier, form the basis for the projection of the most probable scenario:

1. The RISI macro economic assumptions and the consequent overall demand levels produced in the control projection are the best indication available of the likely outlook.

2. Lower production costs can be achieved and the B.C. plywood industry, particularly in the Interior for sheathing, will make the necessary investment to modernize and reduce costs.

3. Market preference factors (evident in central Canada) will result in a continued demand for plywood. The rate of penetration by OSB/waferboard in central Canada will continue at recent levels rather than those prevalent in earlier years when the product was introduced. This assumption is reinforced by No. 2 above.

4. There will be a continuation of a stable demand for sanded plywood. In addition, there will be some increase in the supply of specialty panels though this increase is likely to be small relative to the total structural board demand.

5. Lower production costs together with some easing in EEC tariffs and a greater export effort (supported by more availability for export) will result in some increases in export.

6. Exchange rates will be at the levels indicated in the RISI control projection.

7. U.S./Canada tariffs will change in the early 1990's to a lower tariff but not to zero. There will therefore be very limited plywood movement across the border.

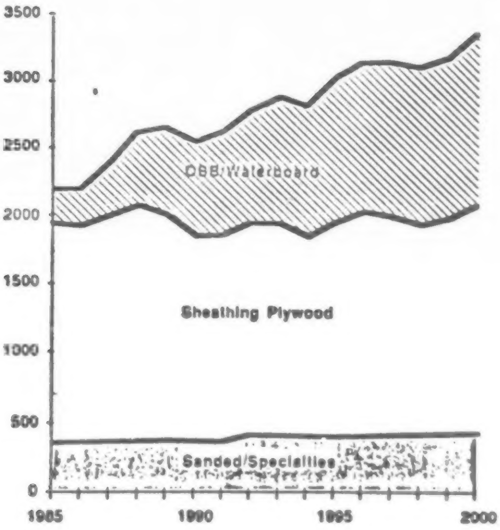
8. The U.S. West can absorb significantly greater volumes of OSB (if it is available) than indicated in RISI control projections. It should be emphasized, however, that this assumption is based only on an extrapolation of what has occurred and what is projected to happen in other parts of the U.S. No detailed market analysis was undertaken.

Results

The results of this "most probable" scenario are shown in Figure 15. This does not include the potential impact of the development of LVL since this is a product line that competes in a different area.

Figure 15

MOST PROBABLE SCENARIO
Thousand m^3



Source: Appendix Table 7

The full details of volumes by year and type of product are shown in Appendix Table 7. The principal aspects are summarized in Table 20.

Table 20

Demand for Panel Products from B.C./Alberta

	1986	1990	1995	2000
		(thousand m^3)		
Domestic				
Sanded/Specialties	310	335	380	390
Sheathing	1,260	1,145	1,145	1,215
Total Plywood	1,570	1,480	1,525	1,605
OSB	120	270	415	490
Export				
Sanded/Specialties	55	50	60	65
Sheathing	300	330	380	430
Total Plywood	355	380	440	495
OSB	150	415	645	795
Total				
Sanded/Specialties	365	385	440	455
Sheathing	1,560	1,475	1,525	1,645
Total Plywood	1,925	1,860	1,965	2,100
OSB	270	685	1,060	1,285

The major implications of the most probable scenario are:

- the demand for plywood (and therefore production) is projected to remain static in the domestic market;
- a slight increase in offshore exports is expected as a result of lower production costs and some improvements in tariffs;
- the volume of OSB shipped will increase substantially, partly due to penetration into the domestic market (estimated at 50 per cent of total sheathing consumption in B.C./Alberta by 1992) but mainly due to exports to the U.S.

In the development of the most probable scenario the emphasis has been entirely on the likely demand for product manufactured in B.C./Alberta. It is necessary to analyze the impact of this demand on the probable development of the industry sector. The outlook for plywood, OSB and other products is discussed below.

The Outlook for the Plywood Sector

The plywood industry in B.C. has been undergoing substantial rationalization in recent years as a result of competition from reconstituted boards. This rationalization has not only involved plant closures but also changes in product lines.

On the Coast, producers are concentrating on the production of sanded, select sheathing and specialties and have almost eliminated the production of regular sheathing. The competition from regular sheathing at Interior mills and from OSB/waferboard has made this grade uneconomic on the Coast. As select sheathing comes under greater pressure from OSB for some uses this product line will also need upgrading. It will be essential that Coastal producers, with high cost but high quality logs, develop specialty product lines. It is believed, however, that this development will be limited unless a major R&D effort is initiated. The demand projections in the most probable scenario are based on the assumption that there will be no dramatic change.

In the Interior, producers have been maximizing the production of select sheathing to reduce reliance on the market increasingly satisfied by waferboard/OSB. Again, however, this product line is threatened. The major opportunity that is open to Interior mills is the potential to radically reduce costs by modernizing their facilities. It has been shown that improvements of up to 30 per cent can be achieved in manufacturing costs. With this cost reduction sheathing can be produced at only 20 per cent above the production cost of waferboard/OSB. Since plywood sheathing is currently being sold at 50 per cent above the waferboard price in Toronto it would seem that plywood production could be very profitable. It is probable, however, that these substantial premiums will not be long term and once the high quality OSB becomes recognized the differential will decline to around 15 per cent.

Should premiums decline, as suggested, it will become essential that plywood producers install the new technologies. Thus, the need for capital expenditure would no longer be simply an attractive opportunity to increase profitability, but would become essential to survival in the long term. Companies with the ability to make this decision in the near future could make some windfall profits while premiums remain high in eastern markets.

As was pointed out earlier, it has been judged that modernization of the plywood industry will occur. The impact of the new technologies on the industry is shown in the following Table 21.

Table 21

The Outlook for the Plywood Industry

	1986		1990		1995		2000	
	Coast	Interior	Coast	Interior	Coast	Interior	Coast	Interior
Number of plywood mills	7	13	6	13	6	11	6	11
Employment	1,750	2,450	1,600	2,250	1,550	2,200	1,500	2,150
Production volume (000 m^3)	650	1,080	550	1,120	600	1,160	570	1,280
Capacity utilization	78%	95%	75%	90%	85%	85%	80%	90%

The productivity of the Coastal industry in terms of production per employee is expected to decline in the near future because there will be a further reduction in the production of commodity product lines. Thereafter, however, ongoing technological improvements should improve productivity. Capacity utilization is projected to continue to be low principally because the accepted capacity levels at many of the Coastal mills are still based on the original configurations before they were restructured to emphasize higher value product lines. If there is any significant breakthrough in the development of specialty products, employment and production levels should increase but it is likely that this production will occur at existing, rather than new, mills.

Productivity at the Interior mills is expected to improve significantly due to modernization resulting in reductions in employment. It is estimated that within the next few years there will be one mill closure which will be balanced by the conversion of a veneer mill to a full plywood facility. By 1995 the closure of the two more mills is projected but volumes will be maintained. Capacity utilization is expected to remain reasonably high.

An additional element that needs examination is the availability of the necessary raw material to supply plywood mills during the period under consideration. Given that a no growth outlook is projected, it is believed that there should be no significant constraint caused due to a lack of resource availability. In the Interior, where the bulk of the plywood will be produced, the new technology will permit the use of a wider spectrum of the resource. On the Coast, though high grade logs will be needed to produce the sanded/specialty plywood, it is believed these logs should continue to be available in the volume required.

The Potential Impact of Additional OSB/Waferboard Capacity in B.C./Alberta

Examination of the availability of raw material for additional OSB/waferboard capacity in B.C. and Alberta indicates that there are a number of alternatives. Each of these could support the installation of new capacity.

There are several areas in both provinces where up to 200,000 m^3 per year of aspen would be economically available in the long term. This supply would support a smaller economy of scale plant of the type being built in some regions. There are a more limited number of unutilized aspen areas which could support the larger plants which require up to 500,000 m^3.

With the latest technology for preparing the material for OSB production it is possible that sawmill residue can be utilized. Within B.C. there are areas where chips are in surplus and are being exported at relatively low returns. A combination of sawmill residue plus the utilization of small wood currently left in the bush would provide the necessary supply for a smaller OSB plant. This possibility exists at more than one location. In addition, the technology exists to produce OSB from the residue from the shingle and shake industry.

It is clear, therefore, that the development opportunities for OSB are not limited by the availability of economic resource. The greater concerns are the market and economics.

The accessible domestic market for OSB production in B.C./Alberta is limited due to the high costs of transportation and existing capacity in Central Canada. At the same time, it has been concluded, in previous chapters, that there is an upper limit to the market penetration that can be achieved by OSB. Consequently, the volumes that can be sold domestically are subject to some constraint.

On the basis of the projections in the most probable scenario, shown in Table 20, domestic shipments represent only a small proportion of existing and planned capacity (775,000 m^3) even though a rapid rate of penetration against plywood has been assumed in the B.C./Alberta markets. Indeed, this rate of penetration is considerably in excess of what has been evident in Central Canada in spite of the many years of waferboard availability.

The implications of this situation are:

- Though a new plant will clearly obtain some share of the local market, it will do so at the expense of other OSB producers. Consequently, the impact on the plywood industry from any further OSB expansion is not believed to be too significant because the competitive pressures from known capacity will already be achieving likely maximum penetration levels. Additional pressure will therefore only have a marginal effect.
- Additional penetration into export markets will be essential. This penetration would be primarily into the U.S. West market region unless some breakthrough can be achieved into Pacific Rim markets.

Despite the presence of the traditional plywood industry in the West and the resulting difficulty in penetrating the market, it seems possible that OSB demand could increase at a greater rate than indicated in the RISI control projections. Whether this demand would be satisfied by additional capacity in the U.S. or Canada would be a function of economics (wood, manufacturing and transportation costs).

There would certainly, however, appear to be some potential for the Western Canadian supplier. The major limitation for B.C. and Alberta producers is the cost of transportation. The potential savings in the use of barge transportation to the U.S. west Coast would favour the location of an OSB facility as close as possible to tidewater. The balancing factor becomes the economic availability of the raw material since it costs more to haul logs than to ship OSB.

The potential outlook for OSB in B.C. in the most probable scenario can be summarized as follows:

	1986	1990	1995	2000
No. of mills	-	1	2	3
Employment	-	100	200	300
Production 000 m^3	-	190	375	600
Capacity utilization	-	90%	85%	90%

Given the rapid acceptance of OSB in the U.S. West in the last one to two years this projection may be overly conservative. It is possible that the sales pressure that will be created when the Louisiana Pacific and second Pelican mills come on stream in 1987/88 would result in a more rapid penetration of the markets. Successful sales could, in turn, encourage investment in plants at an earlier date than projected.

The investment required to build a 200,000 m3 OSB facility is in the region of $45 million, based on current estimates, and about 100 people are needed in the plant. The amount of employment generated in the supply of raw material depends on the nature of the input. If it is based on roundwood aspen extracted from the forest the full time employment created would be approximately 40/50 jobs. However, if much of the logs come from local farmers the number of people involved, on a part time basis, could be significantly higher. On the other hand, if the raw material is based on residue from existing operations, the employment impact would be considerably less.

A major concern related to the potential for OSB is the exchange rate. In the control projections, it has been assumed that the Canadian dollar will gradually increase in value to .83/U.S.$ by the late 1990s. Under this assumption, the prospects for export appear excellent and new capacity should find markets. However, if the dollar strengthens faster and sooner, i.e. to 0.90/U.S.$ by 1991, it could be difficult to compete against new supply potential in the U.S. (see Figure 10).

A further concern, that is common to many industry sectors in Canada, relates to the protectionist attitudes currently prevalent in the U.S. The development of an OSB industry in B.C. is entirely dependent on exports to the U.S. A countervailing or similar duty on OSB would have a very serious impact.

LVL and Other Products

The most significant impact of possible developments such as LVL is that they could provide alternative manufacturing activities and new product lines for plywood plants. As discussed in Chapter 6, the outlook for new product lines is uncertain. LVL, as a product, is technically feasible and also appears to be economically viable. It is believed that in the early 1990's, LVL lines will be introduced into one or more mills.

It seems more likely that new product lines will be introduced at the mills that are being modernized i.e. the operations with more favourable wood costs. Consequently, the development of LVL is unlikely to result in new greenfield operations but will create additional employment at existing operations. This increase could offset the reductions expected in the labour force of the traditional plywood industry.

9

THE INFLUENCE OF GOVERNMENT ON INDUSTRIAL DEVELOPMENT

Introduction

The development of supply/demand scenarios and their implications on the B.C. panelboard industries has been analyzed on the basis of no significant intervention on the part of government. It must be recognized, however, that government policy can have a significant impact on the development of industry. This involvement can take many forms such as incentives to encourage new operations, the support of cooperative ownerships, assistance in research and development, export promotion and so on.

In the 1970's, it was widely believed that the world was going to become critically short of fibre. Consequently, a fibre rich region wishing to encourage industrial development had only to announce that the fibre was to be made available. Industries would then bid for the resource.

The situation has changed in recent years and fibre availability is no longer regarded as a major constraint. The greatest problem is now the availability of capital. As a result, communities wishing to encourage industrial development must now lure potential investors with much more than simply the offer of a resource.

There are many different programs and incentive packages being offered across North America. Though no exhaustive survey was undertaken of all jurisdictions it is believed that the following individual case histories and programs provide a reasonable indication of the type of packages that are made available.

Case Histories

Alberta

There have been two recent announcements by the provincial government.

- OSB plant at Drayton Valley 1986

The total investment is stated to be $55 million with the creation of 435 jobs. The government is purchasing up to $27.5 million in preferred shares. It is understood that these will pay no dividends and will be redeemable at issue value up to a certain time. Thereafter they will be redeemable at an increasingly higher value.

It is worth noting that though a financial package was essentially in place for an earlier OSB plant built at Edson by the same company, the company was able to arrange financing privately. Consequently, the government did not provide any financial support.

- CTMP mill at Whitecourt, 1986

Investment will be $185 million with the government taking a participating debenture of up to $120 million. This debenture will pay interest but the rate has not been made public.

Michigan

- MDF plant, 1985

The total investment was $25 million. A special package was put together by state and local authorities. The principal element in this package was the "Industrial Development Revenue Bond" (IDRB). The IDRB program has been the traditional vehicle for most development incentive packages throughout the U.S. Interest rates vary but tend to be at 65 to 75 per cent of prime rate. In addition, IDRB's provide easier access to venture capital.

It should be noted that the new federal tax reforms may well change the advantages of IDRB's.

In this case, the value of the IDRB was $10 million. In addition, $2 million was made available, at similar interest rates, under the Urban Development Action Grant (UDAG) program through the local township. A further $750,000, also at the same rate, was loaned by the county under a state program known as the Community Block Grant Program.

A number of tax incentives were also made available including property tax relief at 50 per cent for 12 years and a single business tax which has a very substantial effect on taxes paid by the enterprise.

Furthermore, the state guaranteed that the railroad trackage and right of way would be maintained in place. Training grants were available but not utilized.

- OSB plant, 1987

The investment is $35 million but in this case the incentive package is minimal. Louisiana-Pacific apparently has already utilized the maximum allowable under the IDRB program. However, the site has been provided free together with two rail sidings. Training grants may also be provided.

Quebec

- Port Cartier Pulp/Paper Mill 1985

$102 million has been raised to modernize an existing mill. A private company, Papier Cascade, put up $5 million in equity for the facility which was matched by Rexfor, a state owned company, who also provided $17 million as a loan. ITT Rayonier provided $12.5 million in the form of preferred shares and the Quebec government provided a loan of $62 million. Of this loan, $21 million will be interest free for an undetermined period. The balance of $41 million is to be paid back, interest free, in three years after which interest is to be paid at 50 per cent of the prevailing rates.

- Panval particleboard plant, 1984

Total Investment cost was $65 million. A German company, Kuntz and Rexfor raised $15 million, the federal government provided close to $11 million and the Quebec government over $4 million. The balance was raised commercially but it is believed the provincial government provided certain loan guarantees.

Ontario

No information was obtained on specific packages for the forest industry, though a program to encourage modernization of the pulp/paper industry was in place for a period of five years. Under this program, $200 million in total was available in loans and grants, generating a total investment of $1.5 billion over the period.

An indication of the type of package that can be developed can be obtained from the recent negotiations with Toyota. The total investment was $400 million which resulted in the creation of 1,000 jobs. A training grant of $15 million was provided. In addition, a loan of $30/35 million was made interest free for six to seven years and repayable thereafter.

Government Incentive Programs

Minnesota

The state of Minnesota aggressively pursues industrial development and assembles incentive packages based on the following programs:

- Industrial Development Revenue Bonds (discussed earlier). With IDRB's and local credit enhancement programs up to 100 per cent financing can be obtained at below market rates.
- Sales taxes at 0 per cent and property tax reductions.
- Job training and wage subsidies.
- Special enterprise zones where companies can obtain exemptions and credits for sales taxes, corporate income taxes and property taxes over a five year period.

Washington

A detailed explanation of the program developed to revitalize a particular plywood plant is described in Appendix C. Apart from the federal programs such as IDRB and UDAG, which tend to be the major funding vehicles, Washington State provides a number of sources of assistance as follows:

- City Councils - while it is not lawful to extend credit to private corporations, most city structures can and do provide assistance through land acquisition, etc. in order to stabilize employment.
- Port Authorities - Port Authorities are authorized to, and do provide industrial land and buildings at attractive rates to stabilize or create employment.
- Council of Governments (COG) - Many counties have established COG's which can provide funding for studies, and in some instances, low-interest loans from revolving loan funds (RLF).
- Private Industry Councils (PIC's) - These councils provide both study funding and co-ordination/control of job-training grants to co-operative and other organizations.
- State of Washington Employment Security Department - This organization provides direct funding for job training programs, and can allow its program to be used as security on loans.
- State of Washington Department of Community Development - Funding is currently being provided from this department for funding of studies of possible reactivation of plywood and lumber operations.
- U.S. Department of Commerce - This federal agency, through a number of its departments and programs can provide funding and guarantees for low interest loans used in plant reactivation programs.

Alabama

In common with other Southern States, Alabama also has a number of incentive programs. Essentially, these cover similar areas of incentive as already described under Minnesota i.e. the federal programs supported by tax exemptions relative to property, sales and corporate income taxes. In addition, low cost or free land with guaranteed transportation facilities are often a feature.

Michigan

The state has established a Manufacturing Savings Bureau (MSB) with the expertise to develop financial packages. MSB works closely with the Department of Natural Resources to target specific manufacturing opportunities for the forest industry in particular areas. Detailed reports are produced covering the availability of resource, labour, land, transportation facilities etc. together with details of financial incentives, prefeasibility analyses and so on.

MSB offers financing and incentives, in addition to the federal programs, under a variety of programs - venture capital through state pension funds, R&D support, working capital loans, property tax abatement, single business tax, job training grants and so on.

This analysis of some representative case histories and programs indicates that governments believe there is a need to be proactive rather than reactive if business investment is to be attracted locally. Even within the United States, where there is so much conceptual emphasis on free enterprise and theoretical horror of government influence, investors often expect a significant level of assistance and incentive from the different levels of government. Given that the principle has been compromised, it then becomes a matter of negotiation and judgement to decide what level of assistance (in whatever form whether grants, loans at low rates, tax waivers or incentives, etc.) is appropriate or necessary to attract the investor.

Co-operatives Within the Softwood Plywood Industry

Employee ownership, either through co-operative subscription ownership or ESOP (Employee Share Ownership Plan), is an economic technique that has been used effectively within the Pacific Northwest Plywood Industry for both employment creation and employment stabilization. Beginning in the mid 1930's and concurrent with the rapid growth of the softwood plywood industry, a number of co-operatively owned plywood factories were established in the U.S. Northwest, and in Canada.

At peak operating conditions, a total of 27 softwood plywood plants were co-operatively owned in the U.S. and Canada. This number has been reduced during the last 10 years due to closure of some of the more antiquated or more inflexible operations and as a result of the general downturn in the industry.

Employee ownership offers some advantages (and disadvantages) over "conventional" company operations. The primary advantages are:

- flexibility of wage levels to comply with economic constraints;
- flexibility of operating mode;
- freedom from major centralized corporate decision and policy making;
- lower overhead (allocated) head office costs;
- independence of marketing activities;
- higher worker productivity;
- lower supervisory requirements.

Disadvantages include:

- limited capitalization (start-up configuration);
- frequently limited management experience and capability;
- worker influence on policy making decisions;
- limited research and development capability.

In general, the successful employee owned softwood plywood plants are those which have built or purchased low cost facilities, and then efficiently operated to produce specialty products to a high end product return market through production of high value added products such as sidings, overlays and furniture grade plywood.

In the softwood plywood industry of the Pacific Northwest, within a number of areas, activities have taken place to reactivate closed operations, or to prevent closure of existing plants through employee owned co-operative formation.

Victoria Plywood Inc., Victoria, B.C. was formed in early 1984 after the closure of the Pacific Logging owned (formerly Victoria Plywood Limited) plant. After very arduous efforts and much assistance from governmental agencies and Crown corporations, the plant was reopened in 1985.

In the U.S.A., efforts are underway to form co-operatives in at least the following locations:

- **Aberdeen, Washington**

Co-operative formation under study to acquire the assets of the Evans Products Company plant in Aberdeen. Evans is currently in Chapter 11 Bankruptcy, however, the Aberdeen plant may be economically viable if extracted from the overall corporation.

- **Oakridge, Oregon**

Studies and activities are currently underway aimed towards acquisition of the Pope & Talbot Inc. plant in Oakridge.

Of particular interest is the history of the plywood plant at Anacortes in Washington. Full details of this history are provided in Appendix C.

Industry Views

The view of the forest industry regarding government intervention were sought in the course of the study. It was found that industry felt that the government had a considerable role to play in a number of areas. These include government to government efforts to eliminate tariff and non-tariff barriers in export markets, assistance in offshore promotion of panel products and support in the costly area of research and development both technical and market.

There was, however, substantial criticism regarding government financial intervention in the creation of new and competing plants or even the maintenance of facilities that would otherwise close down. The general view was that government at whatever level should not be involved. However, if it were believed essential in order to attract industrial development away from other jurisdictions, then the existing companies should also obtain some benefits.

It should be emphasized that these views were obtained as a result of relatively informal discussions. They should not therefore be regarded as the official industry position.

Conclusions

Government involvement in the development of new industry and sustaining industry that is in danger of closure is prevalent throughout North America and, indeed, worldwide. The direct and indirect benefits of the presence of a manufacturing complex are so substantial that every jurisdiction must compete fiercely to attract new investment. In any such competition there is always an element of negotiation and trading. Currently, it is a buyer's (i.e. the investor) market and it is neither easy nor appropriate to judge, with hindsight, whether any particular incentive package (such as the one arranged with Louisiana Pacific for the Dawson Creek OSB Plant) was the minimum possible or excessive. It must be recognized that a refusal to compete with incentives is unlikely to halt new investment (and thus competition with existing industry) since the investment is more likely to move to another jurisdiction. It is inevitable, however, that where there is an existing industry that will be affected by the new development this industry will view government involvement with disfavour. Therefore, the impact of new development must be analyzed carefully to assess its effect on existing industry.

It would seem fundamental, however, that if a new development (or even the continued operation of an existing company) is only financially viable in the long term with continued governmental financial support then such support should be regarded with extreme caution. Clearly such an operation is not economically viable and would be hard to justify. In contrast, the Anacortes Plywood case history suggests that a viable concern has been created thus avoiding a significant loss of employment and there does not appear to be any continued subsidy that is necessary to keep the operation viable.

The potential for government initiatives in B.C. in the context of the structural panel industry is discussed in the following chapter together with the consultant's recommendations on priorities.

10

POTENTIAL GOVERNMENT INITIATIVES AND RECOMMENDED STRATEGIES

Introduction

Government at all levels - federal, provincial and even municipal - has a role to play in the planned development of industry of all types. This role is particularly important in the case of the forest industry in an area such as B.C. where the forest industry is the principal generator of employment in the primary and secondary sectors.

In this chapter, the areas of potential government initiative are described together with a brief analysis of the cost/benefit relationships that exist for the different approaches. The chapter concludes with the consultant's recommendations on the priorities that should be assigned to the potential initiatives.

Modernization

It has been demonstrated that the plywood industry is in great need of modernization to utilize the new technologies that will allow it to compete. Furthermore, new investment is required in order to develop the variety of specialty products that have been shown have good potential.

Though it is believed that the industry is likely to provide the necessary investment to modernize, clearly any government initiatives in the form of tax incentives, low interest loans, training grants and so on will help to ensure the continuation of a vigorous plywood industry.

The consequences of a failure to modernize are very serious. Without modernization, plywood mills would be unable to compete at the levels assumed and it is likely that the outlook would be close to that originally estimated by RISI in the control projection. Consequently, unless the industry invests approximately $100 million in new technology, over 500,000 m^3 of production annually could be lost by 1995. This loss is equivalent to about $120 million in gross sales and close to 1,000 jobs in the mills. In addition, unless the resource is utilized in other processes, there would be a significant number of logging jobs lost. Furthermore, with the number of mill closures involved, there would be many indirect jobs lost.

New OSB Development

It appears likely that new capacity of OSB will be installed somewhere in the west of Canada or the U.S. to supply the markets in the U.S. West. Whether this capacity is installed in B.C., Alberta or the U.S. West will be the decision of the investors as a result of their analyses of the locational options and economics. The physical availability of resource exists in all areas at varying costs.

Given the current approach by governments to the enticement of new industrial development to their jurisdiction, B.C. will probably have to develop some form of incentive package in order to compete since B.C. has few intrinsic advantages over other regions.

The type of incentive required will depend on the competitive advantages and disadvantages of each specific location and a judgement on the extent of the incentive likely to be offered by some other jurisdiction. These elements are difficult to calculate and it may be more appropriate to base the type and cost of the incentive on the benefits to the Province. As explained in Chapter 8, an OSB facility of the larger type i.e. 200,000 m^3 of product annually can be built for about $45 million and would employ around 100 people in the mill. The gross revenue generated annually would be about $30 million. The resources required to generate this revenue can mostly be provided from within the province - wood, labour, energy and so on. (The principal exceptions are resin, wax and the original equipment since these would be imported.) There is, therefore, a significant annual financial benefit to the Province from the creation of a new OSB facility.

Revitalization of Failing Operations

There are severe short term employment and financial impacts from the closure of an operation. There is, therefore, a strong incentive from the government's point of view to avoid such closure. However, great caution needs to be exercised. It is often long term market forces that have resulted in the fact that the plant is in trouble and, in the consultant's view, government intervention to counteract market forces tends to be, in the long term, counter productive. If the operation is inefficient and not economically viable it will require continued assistance in order to keep operating.

On the other hand, there can be some justification when some restructuring of financial burden can allow an efficient plant to continue on a profitable basis. Similarly, corporate restructuring (such as cooperatives) that may require outside government assistance could be a valid approach.

Inevitably, each situation is very different. Therefore, though government can have a role in the revitalization of facilities in danger of closure, any intervention should only occur after a very detailed analysis of the basic reasons why the plant is failing. It is also important to analyze the full impact of the closure. For example, it may be that the raw material would subsequently be utilized elsewhere. This alternative use could result in some offsetting increase in employment in a more efficient existing operation that could increase production with the additional raw material supply. On the other hand, the potential closure could have a detrimental effect on companies which supply products or services to the operation and result in their failure.

It is worth reiterating that industry tends to have a negative view of this type of government intervention.

Tariffs

The most obvious area of government involvement is at the level of intergovernmental negotiations on tariff and non tariff barriers. Currently, panel exports are under some constraint due to these barriers. This constraint is particularly evident in the EEC and the U.S. - the former mainly due to the disruptive effect of the quota approach and the latter due to the very high level of tariff.

Before government can take any action on these tariffs it is essential that clear directives are provided by industry - not just regarding the obviously desirable results, such as increases in quota for the EEC or removal of the 5 per cent differential between U.S. and Canadian tariffs, but also regarding acceptable fall back positions.

It is difficult to assess the cost to government of pursuing lower tariffs but the benefits of increased exports are substantial.

Promotion

The current governmental participation in export market promotion is an excellent example of joint effort between industry and government. Additional offshore promotional effort could be justified on the basis that there will be greater availability for export and that industry could develop further into specialty products.

In the area of OSB in particular there has so far been little serious effort at promotion to offshore markets. So far a hopeful but sporadic approach has been taken by industry alone. Some consideration should be given to the potential benefits of a more concentrated coordinated effort. This effort would inevitably involve a great deal of work, particularly at the codes and standards level.

An analysis of the relationship between promotional effort and exports was undertaken by the Federal Government in the context of the COMDP program. It was concluded that a very positive cost/benefit relationship existed - particularly for new approaches in new areas (such as 2x4 housing in Japan). It is expected that similar benefits would accrue from an increased promotional effort.

Research and Development

In the earlier discussion in Chapter 6, it was shown that new product lines could have an excellent potential. However, the development costs for specialty products can be very high and a great deal of research at a technical and marketing level is needed. This effort is not always profitable since not all products ultimately succeed. However, without a concentrated, and inevitably expensive, emphasis on new specialty products, the development can be haphazard and less than cost effective. Companies duplicate each others' efforts, the same problems are encountered, the same lessons are learned. It is in this area that government support can be very effective by assisting at the development level and by providing a coordinating function.

It is believed that a combination of a thorough understanding of consumer needs and an innovative technical research effort could result in a doubling of current volumes for specialty products. This development could result in an increase in sales of over $20 million annually and, given the high labour content of specialty products, up to 150 jobs. It is not easy to identify the level of R&D effort required to ensure that new products are developed. However, in the context of the type of uses involved, it should be no more than $1 million.

Recommended Government Strategies

The consultants were requested to recommend priorities to government for the initiatives described above. The following recommendations are based only on an objective analysis of the problems and opportunities that have been identified for the B.C. panel industry, without consideration of overall regional industrial development policies and in the absence of sophisticated cost-benefit analysis.

It must be emphasized, therefore, that these recommendations are made from a relatively narrow perspective and may, as a result, not fit within overall government strategy.

The initiatives to be taken by government can be divided into those which involve major programs and those which are a reemphasis of traditional strategies.

Major Programs

Modernization

Modernization of the plywood industry is essential. It is, therefore, recommended that government should adopt and/or expand incentive programs that encourage and ensure this modernization - including the development of new products such as LVL. Though the support of modernization of existing industry tends to be regarded as a defensive and somewhat unexciting strategy, it is, nevertheless, essential to the continuation of a healthy plywood industry.

The first step should be to initiate discussions with industry to analyze the conclusions of this report and to agree on a framework for development.

New OSB Facilities

Economically viable operations and new jobs can be created in the medium term if further OSB facilities are established in B.C. These operations should have only a marginally detrimental impact on the B.C. plywood industry. It is, therefore, recommended that government should analyze, in detail, the level of incentive package required in order to ensure that these facilities are established in B.C. rather than elsewhere. This cost can then be compared with the financial benefits to the province and related to alternative uses of government funds.

Revitalization

Only in very specific circumstances should government develop restructuring packages to rescue failing industries. As a general principle, it is believed that free market forces should be allowed to prevail. Exceptions to this principle would need very careful analysis to ensure that the revitalized company can continue as an economically viable operation, without further support.

Traditional Strategies

The role of government in the areas of tariffs, promotion and R&D has been well established. Though these activities can be regarded as traditional, they are still extremely important and it is recommended that they should be given even greater support than in the past. Since it is industry that, ultimately, has the task of implementing the strategies and of obtaining the benefits, it is essential that industry is fully involved. It is also believed that a significant proportion of the funding required to carry out promotion and R&D should be borne by industry. This approach has been taken in the past and ensures that the programs are developed in a practical fashion with identifiable benefits.

Once the B.C. panelboard industry and the government are in agreement on the overall framework for development, as recommended above, specific actions can be identified, together with appropriate budgets and funding.

APPENDICES

A Description of Panel Products

- excerpt from "The Panelboard Industry in British Columbia" by Carroll-Hatch (International) Ltd. Sept. 1984

B Field Market Study - Ontario/Quebec

C Case Study - Anacortes Plywood

D Appendix Tables

1 Estimated Canadian Markets for Coniferous Construction Plywood and Waferboard/OSB
2 Canada - Estimated Domestic Consumption of Construction Plywood by Province and Grade - 1984
3 Summary of Demand Concepts for Structural Panels for B.C. and Alberta - Control Projections
4 Low Cost Scenario
5 High Exchange Rate Scenario
6 Structural Board Demand - Judgemental Scenario
7 Most Probable Scenario for B.C. Panelboard Industries

APPENDIX A

1. DEFINITIONS AND PANEL CHARACTERISTICS

The emergence of numerous panel products made from both coniferous and deciduous timber species which have been cut or processed to veneers, flakes, particles, strands, fibres or reconstituted from by-products of wood-using industries has had a pronounced effect on the world's timber based economy. The various panels which result from the numerous systems, which apply heat and adhesives to the wood material, frequently are interchangeable in end-use.

Although the major thrust of this report is to outline the problems, limitations and opportunities in the British Columbia plywood industry and, to a lesser extent the particleboard industry, reference to panels not produced in British Columbia must be made to portray the province's position in the global panel industry.

In order to clarify the rather confusing melange of panels for the non-technical reader, the major panels which concern the British Columbia industries are defined in Section 4.

Panels may be separated into two broad classes:

Structural Class: This is the class into which softwood plywood falls and refers to panels where strength and performance under severe conditions, such as long-term exposure to weather, are the over-riding characteristics. Apearance is not a paramount consideration. Generally, a fully waterproof or "exterior" quality adhesive such as phenol-formaldehyde is required. In Canada, panels classified as structural are generally "softwood" or Construction Plywood, which includes the coniferous plywoods: Douglas-fir, Canadian Softwood Plywood (CSP) and poplar plywood, together with waferboard and oriented strand board (OSB). While some of the poplar plywood is made with a non-exterior adhesive it is included in Construction Plywood by Statistics Canada. The terms "construction", "exterior" and "structural" are used interchangeably in the industry to refer to panels suitable for use under the conditions noted above.

Non-Structural Class: Panels in this class are usually manufactured for applications where long-term exposure to weather and humidity is not expected and strength properties are not critical. Appearance and surface quality are often of major importance, either in the basic panel or in the final stage after further finishing has been applied. The panels are usually produced with a "non-waterproof" adhesive such as urea-formaldehyde. Typical applications include cabinet and furniture manufacture, substrates for prefinishing, wall panelling and miscellaneous millwork. The class includes particleboard, hardboard, softboard (insulating boards, acoustic tiles, etc.), hardwood plywood and medium-density fibreboard (MDF).

Notwithstanding the previous classification, there is considerable overlap in the actual use of all panels. Frequently, a structural panel, for example, construction plywood, is used in a non-structural application such as furniture components, shelving, etc. based on price and availability. Waferboard may be used as an interior, decorative wall panel. Particleboard is used as a sub-flooring element in house construction; hardboard is employed as exterior siding; and softboard (rigid insulating board segment) is used as a wall sheathing.

The technical definition of each panel follows.

Plywood, by definition, is a panel made of cross-banded layers or plies of veneer bonded with an adhesive. Generally the grain of one or more plies is at right angles to that of the adjacent and almost always an odd number of plies are used. Veneer bonded to a core of solid lumber or particleboard is also referred to as plywood. This is normally made for the cabinet and furniture industries.

Construction Plywood

The term "Construction Plywood" is employed by Statistics Canada to include both coniferous plywood and poplar plywood:

i) Douglas-fir plywood (DFP) is a plywood in which all the veneers are of coniferous species, with the face veneer being specifically of Douglas-fir. The adhesive employed must be of exterior quality and is normally phenol-formaldehyde resin.

ii) Canadian softwood plywood (CSP) permits combinations of coniferous and poplar veneers. The face and back must be of coniferous species, other than Douglas-fir. These face veneers are generally spruce, balsam or hemlock, with spruce predominating. Two poplar species, P. balsamifera and P. tremuloides, are permitted to be used with coniferous species under the CSA standard. Adhesive requirements for CSP are the same as for Douglas-fir.

iii) Poplar plywood may be produced with all veneers of poplar species only or with only the face and back veneers of poplar. Inner plies may be of birch or any combination of several coniferous species, spruce being the most commonly used. Poplar plywood may made with either exterior or non-exterior adhesives. When used in structural applications it must conform to the same adhesive requirement as the coniferous plywoods.

Construction plywood may be further sub-divided into two broad grade groups - sanded or sheathing. Sanded plywood is made with a face of the highest quality, smooth cut veneer, which is sanded to prescribed tolerances, permitting high quality final surface treatments, e.g., painting, overlaying. Sheathing plywood has a generally knotty, rough veneer face, with certain open defects and is, for the most part, not sanded. There are, however, select sheathing grades which are given a degree of sanding, to tolerances broader than those specified for sanded grades. Thicknesses of these panels range from 6.35 mm to 25.4 mm while panel dimensions are normally 1220 mm x 2440 mm. Some mills can produce panels 3048 mm in length.

Veneer

Veneer, generally, as employed in construction plywood, is the product of a peeling action in which a log is rotated about its horizontal axis in a lathe, against a specialized fixed knife running the length of the log. The wood material comes off in thin sheets ranging from 2.54 mm to 6.35 mm thick, as required by the thickness of plywood to be made. Veneer may also be produced by a slicing technique in which the log is moved vertically in a reciprocating motion against a knife positioned parallel to the length of the log and advancing slightly with each stroke. This process is usually only employed in production of very high grade face veneers from hardwood logs although cedar and white pine have been cut in this manner in British Columbia.

CSA Standards 0121-M, "Douglas-fir Plywood"; 0151-M, "Canadian Softwood Plywood"; 0153-M "Poplar Plywood"; regulate production in Canada.

Waferboard

Waferboard is a sheet material made from "wafers" which resemble small pieces of veneer about 35 to 75 mm along the grain, with an average of 0.5 mm to 1.0 mm in thickness and widths up to about 30 mm. Waferboard is technically, a type of particleboard, since the wafers are a type of wood particle. However, it is different in both properties and uses.

In Canada, the wafers are cut from roundwood bolts, generally of a poplar species, by waferizing machines in which the knives are mounted on a large revolving disc. The cutting action is similar to that of a veneer slicer. Dried wafers are blended with a phenol-formaldehyde resin and formed into a mat which is hot-pressed to a density of about 670 kg/m^3. As noted later, mixed hardwoods are becoming important sources of log supply in the U.S.A. waferboard industry.

The finished panel is usable in exterior applications due to the waterproof glue employed. Major uses are for roof and wall sheathings and general utility purposes, in direct competition with construction plywood.

CSA Standard 0188.2 M 78 applies to waferboard produced in Canada which has led the world in practical development of the original technology, conceived in the U.S.A.

Oriented Strand Board (OSB)

Oriented strand board (OSB) refers to a waferboard type of panel which, instead of employing rectangular flakes, is composed of long narrow wafers which have been processed to produce "strands" with a length to width ratio of 2 or more. These strands can be aligned, more or less in parallel, to improve the strength properties of the panel.

Strength and stiffness properties are increased in the "long" direction to a level close to that of coniferous plywood and superior to that of waferboard. Pressing and adhesive characteristics are similar to waferboard.

Comply

A veneer can be applied to the face and back of a strand board core to produce a multi-ply structural panel called "Comply". The same type of panel can be made with a particleboard type (non-aligned particles) of core, with phenol-formaldehyde adhesive. There is no production of Comply in Canada.

Generally, waferboard, OSB and Comply are each made and sold in panel sizes similar to plywood, although the production technology permits the production of very large panels up to 244 cm x 488 cm which are subsequently cut to the standard sizes.

Particleboard

Particleboard is a panel generally made for non-structural uses and which is usually, although not always, bonded with a non-exterior adhesive, urea-formaldehyde. With one or two exceptions, the appearance of the panel is that of a relatively fine material as opposed to the characteristically flat wafers found in waferboard. From a technical aspect, both panels are in the same family.

In Canada, particleboard is manufactured from wood material in the form of particles produced by mechanical means such as chipping, flaking, hammermilling, etc. as distinct from fibres which are made by refining by steam and high pressure. The raw material may be from roundwood or from by-products of other processes, e.g., shavings which are subsequently broken down into a random mixture of various shapes and sizes.

Most particleboard is made in a thickness range of 12.7 mm - 25.4 mm with a density range of 640 kg - 720 kg per m^3. Some is made at 300 kg per m^3 for door cores. Recently, the introduction of press systems designed to make panels economically in the 6.35 mm thickness and lower range has brought about the term "thinboard". This class of particleboard is similar to the standard panel in all respects except the average thickness range and, usually, higher densities.

Thinboard may be made in a horizontally oriented, flat, single opening press up to 244 cm x 1524 cm (8' x 50') in dimensions, or by a large diameter drum press up to 244 cm in length of cylinder, in which the mat follows the circumference, passing under several auxiliary pressure rolls. Heat is applied in both systems. Canadian Standard 0188.1-M "Mat Formed Particleboard" applies to the manufacture of particleboard in Canada.

Fibreboard

"Fibreboard" describes panels manufactured primarily from lignocellulosic fibres made by either pressure refining or grinding and then consolidation under heat and pressure in a press. The pressing may be either by a "wet" process in which the fibres are carried in an aqueous suspension and pressed in the wet condition; or "dry" process in which the fibres are dried before pressing. The greatest part of the bond in the wet process results from the interfelting of the fibres. All production in Canada is by the wet process method.

Three types of fibreboards are recognized, generally classified by density range:

i) Hardboard:

Hardboard is fibreboard, generally from 6.25mm up to 11.1mm thick, produced to a density greater than 496 kg/m^3, up to 990/m^3, in a wet process. It is described also as "compressed fibreboard" in international publications. A minimal amount of phenolic resin is added before pressing. The wet process requires a screen installed on the press plate to permit escape of steam. The screen imparts a pattern to the fibre mat so that the lower side of every panel is "screen backed". This rough appearance limits the usefulness of the panel, since only the smooth face side can be exposed in applications where surface quality is important, e.g., prefinished paneling.

ii) Softboard:

Softboard is a fibreboard made in a wet process and pressed to densities less than 496 kg/m^3. It is also called "rigid insulating board" in North America and "non-compressed fibreboard" internationally. This is sometimes impregnated with asphalt for wall sheathing uses. Ceiling (or acoustic) tiles are becoming the major products of the softboard group. Generally, starch is used as a binder in these. Most softboards are about 12mm thick.

iii) Medium-Density Fibreboard (MDF):

MDF is made by the dry process with the addition of about 10% of urea-formaldehyde resin and compressed to a density range of 720 - 880 kg per m^3. Most MDF panels are in the 15.8mm to 19mm thickness range. The panel is typically smooth and even-textured, with excellent edge and machining properties, and may be used either as a core panel or as a substrate for direct printing and finishing. A key element in the production process is the use of a pressurized steam refining system to produce the "slurry" which is then flash-dried prior to blending and pressing. There is no production of MDF in Canada, although mills are planned for Alberta and Ontario.

Quality standards for fibreboards are regulated by the Canadian General Standards Board (CGSB), which administers standards for Federal Government purchases.

Hardwood Plywood

The other class of plywood made in Canada, distinct from the construction class, is generally referred to as hardwood plywood. While, botanically, poplar is a hardwood, for statistical purposes it is included in the "Construction Plywood" class by Statistics Canada. The building and plywood industries use the term hardwood plywood to include panels made with various native veneer faces such as birch, maple, elm and ash; and foreign species such as rosewood, teak, lauan, meranti, mahogany, walnut, etc. Most of the latter types of plywood are imported in panel form, although some veneer is imported and applied to cores such as particleboard in Canada. Particleboard may be overlaid with films or prefinished with lacquers and printed papers in Canada. These are also categorized in the hardwood plywood class although they are not strictly plywoods. CSA Standard 0115 "Hardwood Plywood" refers to the production of hardwood plywood in Canada.

APPENDIX B

Survey of Ontario/Quebec Markets for Plywood Oriented Strand Board and Waferboard

Introduction

Statistical data indicate that the plywood portion of the structural panel* market in Ontario dropped from 78% in 1979 to 59% in 1985 and in Quebec from 88% to 76%. Waferboard and OSB made corresponding gains.

However, it is interesting to note, that the volume of plywood consumed in 1985 was approximately the same as in 1978. We concluded from these observations that a study of attitudes in eastern Canada would provide useful clues to the future markets for structural panels in the rest of Canada.

Waferboard and oriented strand board have been available in Ontario and Quebec for 15 years and in sufficient volume to supply all available demand during the period reviewed. There was, therefore, good reason to believe that the market distribution and use relationships between plywood and waferboard/OSB had stabilized and that a survey of the trade and consumers would provide useful and reliable information for predicting future developments in the panel board industry and its markets.

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* Structural Panels - Plywood, Waferboard, Oriented Strandboard

Methodology

Time constraints confined personal interviews to the Toronto- Hamilton-Kitchener corridor and to Montreal and Ottawa. The majority of contacts were knowledgeable managers involved in the distribution and sale of plywood, waferboard, OSB and other building products. Users and specifiers of panel products were interviewed and some of their statements and opinions were checked with Canada Mortgage and Housing Corporation and the Canadian Standards Association.

A copy of the questions that were used as a guide when conducting the interviews and to subsequently record findings is attached.

A great deal of the information obtained is qualitative. It was given freely and frankly and we feel it represents the good judgement of individuals well informed in their fields. Every person interviewed had sold, used, or was directly involved in the specification or control of the use of plywood, waferboard or OSB.

Following the study in eastern Canada confirmatory interviews were conducted in British Columbia.

Ontario - Toronto, Hamilton, Kitchener Market Share

In Ontario, comments were solicited on the following statistics derived from Statistics Canada data. It was also pointed out that the volume of plywood shipped to Ontario in 1979 and in 1985 was approximately the same-roughly 468 thousand cubic metres.

Ontario Market Share
Plywood versus Waferboard

thousands of m^3

	Plywood		Waferboard/OSB	
	Volume	%	Volume	%
1979	468	78	129	22
80	435	77	133	23
81	372	68	175	32
82	292	67	147	33
83	376	60	254	40
84	385	55	311	45
85	469	59	320	41

In general, these data were accepted as representative of the Ontario market. They do not necessarily reflect precisely the experience of all the interviewees or regional discrepancies.

The following comments were recorded following review of above statistics:

- Our sales heavy to industrial users therefore higher percentage of plywood. Housing market very strong estimates total plywood to waferboard at 50-50%.
- Split OK for Ontario but wide swings in different market areas. Toronto tract builders favour waferboard. Plywood use higher outside megalopolis.
- Waferboard dominates housing market. Waferboard 80% Plywood 20%. 60% of plywood used in housing for roofs.
- Use of plywood for roofs decreases in winter, on higher pitch roofs and when subtrades can make, or force, a choice.
- Market for plywood could hold at current levels with slow growth if economy continues to improve.
- Split does not reflect sales of lower volume, profit oriented distributor. Waferboard is not a high profit item.
- Split does not apply to lumber dealer sales. Waferboard sales are to tract builders. Smaller builders still use plywood. Estimate subfloors

80% Waferboard; roofs 50-50 depending on time of year and slope of roof.

Factors Affecting Markets for Plywood, waferboard, Oriented Strand Board - Ontario

All distributors contacted handled both plywood and waferboard and expressed opinions on the properties, use and future prospects for waferboard, OSB and plywood.

- Normick produced and distributed an oriented strand board and sought a premium for it. The market considers waferboard and OSB are variants of the same panel having properties suitable for sheathing uses. Normick was unable to obtain a premium for OSB.
- Very small amounts of Pelican OSB have been seen in central Ontario. It is too soon to determine if it will be regarded as just another waferboard. On the basis of Normick's experience it will have to have recognizable, superior and saleable properties in order to obtain higher prices than waferboard.
- Delivery costs play key role in determining the viability and profitability of waferboard mills. Doubts were expressed that a B.C. OSB mill could compete in eastern Canada without advantageous freight rates.
- OSB will not receive a premium for wall, floor and roof sheathing in housing. If the bending strength is as good as claimed it may fill some industrial requirements e.g. seat bottoms, water beds.
- The tract builders visited have used both plywood and waferboard. A variety of wall sheathing products are being used including "insulating fibreboard" and Celotex. Those tract builders who now use waferboard feel they will use more in future. They had not heard of OSB.
- Generally waferboard is well made but swelling of subfloor edges sometimes require sanding off before finish flooring can be applied.
- Opinion was expressed that all waferboard production will be oriented and that unless this imparts properties superior enough to justify the use of thinner panels than currently specified it will not be possible to charge a premium for OSB.
- Distributors, dealers and many end users are convinced that there is, and there will remain, a residual and relatively constant market for plywood even in those uses where waferboard has proven itself and in spite of substantial price differentials. This was said to be due to: habit, established practice (no hassles with building inspectors) inertia and some dealers' conviction that plywood is a more versatile stock item.

Waferboard - Market Areas

As the waferboard industry in Canada and the U.S.A. matures "rational" market areas will develop and be served, in the main, by mills that are stratgegically located for serving these markets. Already some companies in the U.S.A. are locating mills on the assumption that delivery costs are critical to profitable operation.

Market Preferences

- Tract housing has switched to waferboard on the basis of price and availability.
- Smaller builders continue to use plywood because cost savings to the builder of single houses do not offset the quality image ascribed to plywood.
- The concrete form market is almost exclusively plywood.
- Plywood is favoured by custom packaging firms - weight is a determining factor. Also all reference specifications call for the use of plywood.
- There is a constant demand for Douglas fir plywood. It is fact that this strong preference reflects the persistent effects of the aggressive and wide spread promotion of Douglas fir plywood by the producers many years ago.
- Many industrial uses are still, and will remain plywood.
- Douglas fir and Canadian softwood plywood are called up in many specifications as a result of work over the years by representatives of the plywood industry. Even where "or equal" clauses are included in the specifications it is easier for the contractor or manufacturer to use the material specified than to seek permission to use substitutes. Unless the waferboard industry is able to undertake the onerous task of getting these specifications redrafted, plywood will continue to enjoy these markets.
- Manufacturers of industrial products stated that the plywood used in the manufacture of their products represents such a small proportion of the final cost that it would be unproductive and unprofitable to experiment with substitute materials and possibly waste expensive hardware and fittings.
- The lighter weight of plywood is an advantage for large forms the extra weight of waferboard reduces speed of erection and puts strain on cranes and men.

Plywood Specialties

Clearly, some plywood manufacturers and some distributors are specializing in selected markets and offering products made to meet the requirements of their customers. Overlaid concrete form panels with superior lay ups are an obvious example.

It was noted:

- Specialties require more promotion and advertising to build up increased volumes and better profit margins.
- Overlaid plywood panels produce superior concrete surfaces and this is a strong selling point.
- The strength properties of plywood concrete forming panels are increasingly important - faster and higher pours, excessive use of vibrators, free flowing mixes and rapid pumping all impose very severe loads on the concrete forms.
- It was stated that practically all failures reported and investigated are due to unreasonable construction practices and not poor performance of the forms or forming materials.

U.S. Plywood Imports

- U.S. plywood imports are very small.
- Some recent offerings have been made at very competitive prices in spite of duty and dollar difference. These are sporadic distress offerings and not available on demand.
- Some regular imports of plywood panels are types or sizes that are not made in Canada e.g. 12' long panels.

Free Trade

Price Relationships Plywood/Waferboard

- Waferboard "bought" its way into the sheathing market at very low levels. Competition and overproduction have prevented the waferboard producers from establishing more realistic and profitable prices.
- At the time of the survey 7/16" waferboard wall and roof sheathing was selling at $90-$100/thousand square feet below 3/8" plywood and 5/8" waferboard subflooring $190-200 below 5/8" plywood.
- All distributors felt the spread between plywood and waferboard to be unreasonably large and complained about "money being left at the table."

Developing Markets

- The market for preserved wood foundations in Ontario is growing. Estimates in excess of 2500 houses in 1986.
- It is important that the industry produces enough treatable plywood (HEM/FIR) to ensure the full development of the PWF market.
- There could be a market opportunity for cut to size panels in the packaging and crating industry.

Waferboard Standards & Grading

There appeared to be a lack of awareness of Waferboard/OSB standards and any recognition of a grading system. More precisely defined and publicized specifications might encourage more selective buying.

- Grades were described as:

"Regular" and "Reject"
No. 1 and Reject
No. 1 and Falldowns
No. 1 and Factory
No. 1, Shop and Degrade
No. 1, Factory and Degrade (cull)
No. 1 and No. 2
Good and Bad!!
Good and Factory

Codes and Standards

- Several references were made to the importance of CMHC acceptance for waferboard and plywood.

Introduction - Quebec

The time spent in Quebec was much shorter than in Ontario because it was felt that a great deal of the data obtained would be repetitive. There are some distinctive elements to the Quebec market and the following notes will be confined to those observations that relate specifically to Quebec.

Market Shares

Statistics Canada data indicates that the Quebec market shares are as follows:

Plywood versus Waferboard
thousands of cubic metres

	Plywood		Waferboard	
	Volume	%	Volume	%
1979	385	88	55	13
80	353	85	60	15
81	289	81	67	19
82	265	81	64	19
83	339	75	116	25
84	322	71	98	29
85	349	77	109	24

These figures were compared with those from Ontario (page 3). It was observed that Quebec is more conservative than Ontario but that further growth in the use of waferboard is expected. Plywood volumes are expected to remain stable at current levels. The market shares shown were considered representative for Quebec as a whole.

Factors Affecting Markets for Plywood, Waferboard and Oriented Standboard -Quebec

- Stability problems with waferboard reported when moisture present.
- Plywood is the universal choice for forms and is not likely to be displaced by waferboard.
- Some Brazilian plywood has been imported and is being tried out by one of the largest concrete forms contractors in the area. This firm was not prepared to comment on the peformance of the Brazilian product other than to say that the overlay appears satisfactory but they have yet to satisfy themselves about the performance and suitability of the inner plies.
- Pelican Sturdiwood is selling in Montreal on a trial basis.
- Very doubtful a B.C. waferboard plant could expect to compete in eastern Canada because of delivery costs.
- Canadian waferboard plants require substantial U.S. markets to justify their existence.
- Experience with waferboard and Canadian softwood plywood for roofs has been unfavourable due to snow loads. Many Quebec builders use 1/2 Douglas fir plywood for roofs.

Price relationship - Quebec

- 3/8" plywood is $100/M more than 7/16" waferboard
- 5/8" plywood is $200/M more than 5/8" waferboard

The excessive discount for 5/8 waferboard versus 5/8 plywood reflects the extremely low price offered to buy into the market. This is not realistic and makes waferboard sales unprofitable.

- Abberations in prices often relate to special shipping/freight deals. The key to profitability is often dependent on shipping costs.

Market Preferences

- Plywood is preferred for flat roofs in Quebec.

- Balconies 5' wide are a market for specialty (size) plywood.

Conclusions

1. Waferboard has largely replaced plywood for roof, wall and floor sheathing in tract housing in Ontario (80% waferboard 20% plywood) and to a lesser extent in Quebec.

2. There is continuing and relatively stable demand for plywood from smaller home builders.

3. In the opinion of interviewees, the Ontario market for plywood will remain at the 500 MM 3/8 level with slow growth if the economy continues to improve.

4. A market preference for oriented strand board has not developed and it is unlikely that OSB will command a premium price.

5. Delivery costs play a key role in determining the viability and profitably of waferboard mills and it was felt that a B.C. mill would be unable to compete in eastern Canada.

6. There is and there will remain a residual and relatively constant market for plywood in eastern Canada.

7. In the eyes of the market the principal advantage of waferboard is price and availability.

8. The concrete form market is almost exclusively plywood.

9. In applications where weight or strength to weight ratio is a factor plywood has an advantage over waferboard.

10. The market could probably consume more Douglas fir plywood than is presently available.

11. Government and industrial specifications and established practice call for the use of plywood and the substitution of waferboard will be slow.

12. Specialty plywood manufacturers are successfully developing selected markets.

13. Price spreads between waferboard and plywood sheathing are so large as to freeze plywood out of the large tract builder market.

14. The market for preserved wood foundations is growing.

15. The grading of waferboard is not well understood in the market place.

16. CMHC acceptance continued to be an important element in the sale and selection of products by builders and specifiers.

17. Waferboard will take an increasing share of the Quebec market but the volume of plywood consumed will remain relatively stable.

APPENDIX C

Case Study - Anacortes Plywood

The softwood plywood facility currently owned and operated by Anacortes Plywood, Inc. (API) was originally constructed in 1938 by a co-operative association, Anacortes Veneer Inc. (AVI) at Anacortes, Washington. When originally formed, AVI shares were sold for $1,000 cash plus a pledge of $3,000, for a total of $4,000 per share. Following initial plant start-up in 1939, the rapidly growing and profitable plywood market allowed the company to up-grade its operation, acquire forest holdings, and to expand to a secondary dry-process hardboard operation, all paid for from generated cash flow and profits.

During World War II, AVI developed and produced a range of overlaid (resin impregnated paper) products, including an overlay which was used extensively by the U.S. Navy in constuction of PT boats. Following World War II, AVI continued to produce overlays, and further expand their specialty line to include scarf-jointed plywood (up to 40 feet long by 6 feet wide), and to hardboard and hardwood overlaid softwood plywood.

Profits generated in this period were such that higher than industry standard wages plus patronage dividends were paid to subscribers, to the extent that, in 1954, Look Magazine featured the operation describing them as "The Richest Sawmill Workers in America". During this time also a lawsuit was entered against AVI by a coalition of labor unions, claiming excessive wage payment to shareholders. This suit was not successful.

In 1969, the assets of AVI were purchased by Publishers Forest Products a division of Times Mirror. The purchase price was 16.5 million, resulting in a return for each working share of $55,000.00.

Publishers retained all original employees, and operated the facility until 1981. During the period of Publishers' operation, capital improvement of the plywood facility continued. However, the woodland resources were sold, traded or re-allocated to other divisions of Publishers, and the specialty product mix was eroded in favor of a higher ratio of commodity products more suited to a corporate sales organization with a multiple plant distribution philosophy.

In September, 1981, Publishers permanently closed the facility, citing unsatisfactory financial performance, and offered the physical plant for sale for an asking price of $3.5 million.

By November of 1982, it became apparent to former employees and shareholders (and to Publishers) that there was little likelihood in the depressed industry that the plant would be purchased and re-opened by a major company. Following some period of discussions and meetings, a group was incorporated in March 1983 under the name of Anacortes Plywood, Inc., to raise capital (through share sales), purchase, and operate the facility as an employee owned co-operative.

During formative stages, it was determined by the AVI group that not all of the Publishers plant was economically operable:

- The dry process hardboard plant could not be cost competitive with imported hardboard products.
- The green-end of the plant was both obsolete and non-viable due to the absence of reasonable cost peelable quality logs.

It was determined, however, that the plant could operate on a sustained term basis by purchasing green veneer on the open market, and could ensure viability by producing only those products which yielded a high variable margin i.e. value added specialty products. All planning (and subsequent operation) was based on a product mix of 40% sidings, 40% overlays, 10% specialty sanded and 10% falldown and/or sheathing.

After 12 months of negotiations, organization and frustration, the facility was finally purchased for a net cost to the shareholders of $1.6 MM, with the following financial structure:

Total Purchase Price	$2,400,000
Proceeds for payment:	
First Mortgage (1st. Interstate)	1,000,000
Sale of Surplus Assets (to City of Anacortes)	500,000
Block Grant Loan (secured by Job Security grant)	300,000
Cash from Shareholders	600,000
Total	**2,400,000**

Some further explanation of the rather complicated funding of this project is required.

In the State of Washington (as opposed to 38 of the 50 states), it is unlawful for a city, county or the state to loan funds directly, or to lend its credit to private enterprise corporations. Due to the urgency of this project, and the fact that both the City of Anacortes and Skagit County has lost some 60% of its industrial jobs and were running an unemployment rate more the double the state average, innovative action was required.

The City of Anacortes is mandated to create an industrial land bank. It was, therefore, able to purchase some nine acres of prime industrial land from API (which land was surplus to its requirements), on a back-to-back purchase agreement, for the sum of $500,000, which was below the appraised value of that parcel. This effectively reduced the acquisition cost by $500,000.

The City of Anacortes had secured a $530,000 PIC (Public Improvement Commission) grant from the Federal government, administered through the Washington State Department of Community Development. These funds were not earmarked for utilization until 1986-87, therefore with the approval of Country, State and Federal agencies, a portion of the "Federal" funds were then "conduited" to a loan to API, with the proviso that a suitable loan guarantee could be placed. This action avoided the direct lending of the city, county or state monies as it was "Federal" funding involved.

With all real properties pledged to the first mortgage, other loan guarantees had to be found. A Federal/State Job Training Program grant was available for up to $500,000, which would be paid to API at the rate of 50% of employee wages for all employees qualifying under Title I or Title II eligibility (chronic unemployed or underemployed classifications). These funds were assignable and payable directly to a trust account for repayment of the $300,000 conduited loan. Again, with the approval of the City, County, State and Federal agencies, this was done and the loan was put in place.

With working capital provided by additional shareholder funds, supplier credits, further sale of surplus assets (Hardboard plant land and equipment, Green-end equipment), and eventually a further Federal/State/County funded loan, the plant was re-opened in April of 1984, and continues in operation to date with a total employment of 185 people.

APPENDIX D

Appendix Table 1

Estimated Canadian Markets
for
Coniferous Construction Plywood and Waferboard/OSB

(thousands of m^3)

	British Columbia			Alberta			Saskatchewan			Manitoba			Western Total		
	Ply	WB[1]	Total	Ply	WB[1]	Total	Ply	WB[1]	Total	Ply	WB[1]	Total	Ply	WB[1]	Total
1979	410.0	3.0	413.0	394.2	16.0	410.0	110.3	22.0	132.0	101.9	18.0	120.0	1,016.4	59.0	1,075.0
1980	474.8	4.0	479.0	397.7	18.0	416.0	89.7	23.0	113.0	75.6	20.0	96.0	1,037.8	65.0	1,103.0
1981	413.9	10.0	424.0	380.8	39.0	420.0	98.6	32.0	131.0	88.5	25.0	113.0	981.8	106.0	1,088.0
1982	298.0	8.0	306.0	282.8	31.0	314.0	74.6	18.0	93.0	70.5	15.0	85.0	725.9	72.0	798.0
1983	365.8	20.0	386.0	274.9	35.0	310.0	99.5	20.0	119.0	85.3	16.0	101.0	825.5	91.0	916.0
1984	289.0	35.0	324.0	218.0	45.0	263.0	63.0	27.0	90.0	91.0	20.0	111.0	661.0	127.0	788.0
1985	286.0	38.0	324.0	246.0	56.0	302.0	68.0	30.0	98.0	97.0	23.0	120.0	697.0	147.0	844.0
1986	298.0	50.0	348.0	259.0	81.0	340.0	70.0	40.0	110.0	99.0	29.0	128.0	726.0	200.0	926.0

	Ontario			Quebec			Atlantic			Eastern Total			Canada Total		
	Ply	WB	Total	Ply	WB	Total	Ply	WB[1]	Total	Ply	WB	Total	Ply	WB	Total
1979	413.1	129.0	542.0	365.2	55.0	420.0	123.1	16.0	139.0	901.4	200.0	1,101.0	1,917.8	259.0	2,176.0
1980	434.8	133.0	567.8	353.3	60.0	413.0	110.4	17.0	127.0	898.5	210.0	1,108.0	1,936.3	275.0	2,211.0
1981	371.5	175.0	547.0	288.9	67.0	356.0	95.7	20.0	116.0	756.1	262.0	1,018.0	1,737.9	368.0	2,106.0
1982	292.0	147.0	439.0	264.6	64.0	329.0	70.0	12.0	82.0	626.6	223.0	850.0	1,352.5	295.0	1,648.0
1983	375.5	254.0	630.0	338.7	116.0	455.0	102.3	13.0	115.0	816.5	383.0	1,200.0	1,642.0	474.0	2,116.0
1984	385.0	311.0	696.0	322.0	98.0	420.0	93.0	14.0	107.0	800.0	423.0	1,223.0	1,461.0	550.0	2,011.0
1985	469.0	320.0	789.0	349.0	109.0	458.0	90.0	15.0	105.0	908.0	444.0	1,352.0	1,605.0	591.0	2,196.0
1986	593.0	468.0	1,061.0	380.0	135.0	515.0	102.0	18.0	120.0	1,075.0	621.0	1,696.0	1,801.0	821.0	2,622.0

Source: Statistics Canada, CHI
[1] Woodbridge, Reed estimates
1986 - Woodbridge, Reed projection from 5 month data

Appendix Table 2

Canada
Estimated Domestic Consumption of Construction Plywood by Province and Grade - 1984

(thousand m^3)

	DFP				CSP		Overlaid	Total
	Sanded	Sheathing		Concrete Form	Sheathing			
		Sel	Std		Sel	Std		
B.C.	40	20	61	5	27	90	15	258
Alta.	35	9	26	4	5	110	5	194
Sask.	10	3	12	2	11	20	1	59
Man.	10	2	20	2	10	33	4	81
Ont.	50	4	44	16	31	170	14	329
Que.	50	10	15	12	30	156	12	285
Atl.	20	5	13	5	10	37	3	93
Total	215	53	191	46	124	616	54	1,299

Note: Sel = Select; Std = Standard

Source: CHI

Appendix Table 3

SUMMARY OF DEMAND CONCEPTS FOR STRUCTURAL PANELS FOR B.C. and Alberta - Control Projections

	Annual																					
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CANADIAN DEMAND QUANTITIES (BSF, 3/8-INCH)																						
Domestic Demand for Structural Panels	2.60	2.42	2.49	2.05	2.35	2.32	2.51	2.74	2.91	3.00	2.96	2.96	2.99	3.20	3.22	3.17	3.34	3.45	3.54	3.51	3.51	3.70
Plywood	2.32	2.12	2.12	1.69	1.86	1.71	1.77	1.83	1.86	1.89	1.74	1.50	1.36	1.48	1.36	1.13	1.15	1.09	0.94	0.73	0.73	0.83
OSB/Waferboard	0.28	0.31	0.36	0.36	0.49	0.61	0.74	0.91	1.05	1.10	1.22	1.47	1.62	1.72	1.87	2.03	2.19	2.36	2.60	2.78	2.78	2.87
Export Demand for Structural Panels	0.82	0.92	0.73	0.70	0.86	1.19	1.31	1.27	1.44	1.65	1.74	1.65	1.74	1.97	2.05	1.95	2.03	2.17	2.12	1.94	2.11	2.19
Plywood	0.51	0.58	0.39	0.43	0.45	0.48	0.48	0.39	0.45	0.48	0.48	0.41	0.45	0.48	0.45	0.36	0.40	0.42	0.39	0.30	0.35	0.38
OSB/Waferboard	0.30	0.34	0.34	0.27	0.41	0.70	0.84	0.88	0.99	1.17	1.26	1.24	1.29	1.49	1.60	1.59	1.63	1.74	1.73	1.64	1.76	1.82
Total Demand for Canadian Structural Panels	3.42	3.34	3.21	2.75	3.21	3.51	3.82	4.01	4.35	4.64	4.71	4.61	4.72	5.16	5.27	5.11	5.38	5.62	5.66	5.44	5.62	5.90
Plywood	2.83	2.69	2.51	2.12	2.31	2.20	2.25	2.22	2.31	2.37	2.22	1.90	1.81	1.95	1.81	1.49	1.55	1.52	1.33	1.03	1.08	1.21
OSB/Waferboard	0.58	0.65	0.70	0.64	0.90	1.31	1.58	1.79	2.04	2.27	2.48	2.71	2.91	3.21	3.47	3.62	3.83	4.10	4.32	4.41	4.54	4.69
U. S. DEMAND QUANTITIES (BSF, 3/8-INCH)																						
Total Demand for U.S. Structural Panels	20.00	17.63	17.29	16.29	20.36	23.01	23.68	26.58	27.00	27.05	25.61	23.16	25.78	27.48	26.96	25.37	27.76	29.17	28.53	26.80	28.31	30.22
Rough Plywood	15.94	13.86	13.35	12.34	15.51	16.86	16.62	18.32	17.74	17.07	14.89	12.19	12.75	13.50	12.50	10.80	11.50	11.61	10.72	9.10	9.17	10.11
Sanded Plywood	3.49	3.17	3.21	3.03	3.28	3.65	3.71	3.82	3.86	3.97	3.89	3.68	3.76	3.88	3.85	3.61	3.67	3.75	3.69	3.51	3.35	3.66
OSB/Waferboard	0.58	0.60	0.72	0.92	1.56	2.50	3.34	4.43	5.40	6.01	6.83	7.28	9.28	10.09	10.62	10.96	12.58	13.81	14.12	14.19	15.79	16.44
U.S. IMPORTS OF CANADIAN OSB/WAFERBOARD	0.30	0.34	0.34	0.27	0.42	0.70	0.84	0.87	0.97	1.14	1.23	1.19	1.21	1.43	1.52	1.48	1.50	1.63	1.59	1.46	1.57	1.66
REGIONAL DEMAND QUANTITIES (BSF, 3/8-INCH)																						
B.C. & ALBERTA STRUCTURAL PANEL DEMAND	0.90	0.92	0.97	0.73	0.74	0.63	0.65	0.68	0.72	0.79	0.79	0.77	0.77	0.83	0.83	0.80	0.85	0.87	0.88	0.85	0.86	0.92
Plywood	0.88	0.90	0.92	0.69	0.69	0.57	0.56	0.58	0.60	0.61	0.57	0.50	0.46	0.50	0.47	0.40	0.41	0.39	0.34	0.27	0.27	0.32
OSB/Waferboard	0.02	0.02	0.05	0.04	0.05	0.07	0.09	0.10	0.13	0.18	0.22	0.26	0.31	0.33	0.36	0.40	0.44	0.48	0.54	0.58	0.58	0.60
WESTERN U.S. STRUCTURAL PANEL DEMAND	5.17	4.42	4.10	3.74	4.82	5.64	5.98	6.71	6.83	6.77	6.37	5.82	6.55	6.91	6.87	6.52	7.11	7.38	7.29	6.91	7.34	7.73
Rough Plywood	4.26	3.61	3.30	2.98	3.92	4.46	4.52	4.96	4.78	4.58	4.28	3.87	4.27	4.40	4.21	3.87	4.14	4.09	3.70	3.46	3.74	3.83
Sanded Plywood	0.86	0.79	0.78	0.73	0.80	0.92	0.96	0.98	0.99	1.02	1.00	0.97	1.00	1.04	1.05	1.00	1.02	1.04	1.04	1.00	1.02	1.06
OSB/Waferboard	0.05	0.02	0.02	0.03	0.11	0.26	0.50	0.77	1.05	1.17	1.08	0.99	1.28	1.47	1.61	1.66	1.96	2.25	2.55	2.44	2.58	2.84
WESTERN U.S. IMPORTS OF CANADIAN OSB/WAFERBOARD	—	—	—	0.01	0.02	0.14	0.17	0.17	0.23	0.37	0.47	0.45	0.47	0.56	0.61	0.61	0.64	0.71	0.71	0.66	0.71	0.75

Source: RISI Control Projection

For conversion to m^3 - 1 m^3 = 1130 sq.ft. 3/8"

Appendix Table 4

LOW COST SCENARIO

	Annual															
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CANADIAN DEMAND QUANTITIES (BSF, 3/8-INCH)																
Domestic Demand for Structural Panels	2.51	2.74	2.93	2.99	3.01	2.99	3.02	3.21	3.23	3.16	3.34	3.47	3.53	3.51	3.52	3.73
Plywood	1.77	1.83	1.89	1.91	1.86	1.75	1.70	1.77	1.65	1.48	1.45	1.43	1.27	1.06	0.94	1.02
OSB/Waferboard	0.74	0.91	1.04	1.08	1.15	1.24	1.32	1.45	1.59	1.67	1.89	2.04	2.26	2.45	2.58	2.71
Export Demand for Structural Panels	1.31	1.27	1.43	1.67	1.85	1.74	1.84	1.97	2.00	1.90	1.97	2.12	2.06	1.85	1.92	2.01
Plywood	0.48	0.39	0.45	0.48	0.50	0.43	0.50	0.52	0.52	0.41	0.48	0.51	0.47	0.36	0.42	0.45
OSB/Waferboard	0.84	0.88	0.98	1.19	1.34	1.32	1.34	1.44	1.49	1.49	1.49	1.61	1.59	1.49	1.50	1.56
Total Demand for Canadian Structural Panels	3.82	4.01	4.36	4.66	4.86	4.74	4.86	5.18	5.24	5.06	5.31	5.59	5.59	5.36	5.45	5.74
Plywood	2.25	2.22	2.34	2.39	2.36	2.18	2.20	2.29	2.16	1.90	1.93	1.94	1.74	1.42	1.36	1.47
OSB/Waferboard	1.58	1.79	2.02	2.27	2.50	2.56	2.66	2.89	3.07	3.16	3.38	3.65	3.85	3.94	4.08	4.27
U. S. DEMAND QUANTITIES (BSF, 3/8-INCH)																
Total Demand for U.S. Structural Panels	23.68	26.58	27.28	27.00	26.32	23.56	26.23	27.82	27.19	25.35	27.92	29.47	28.52	26.99	28.75	30.68
Rough Plywood	16.62	18.32	18.03	17.18	16.00	13.64	14.70	15.16	14.27	12.70	13.53	13.94	12.74	11.34	11.95	12.67
Sanded Plywood	3.71	3.82	3.86	4.00	3.96	3.79	3.90	4.02	3.97	3.70	3.76	3.83	3.76	3.57	3.59	3.71
OSB/Waferboard	3.34	4.43	5.39	5.82	6.35	6.13	7.63	8.63	8.95	8.95	10.63	11.71	12.02	12.08	13.20	14.31
U.S. IMPORTS OF CANADIAN OSB/WAFERBOARD	0.84	0.87	0.96	1.17	1.31	1.27	1.27	1.38	1.40	1.38	1.36	1.50	1.45	1.32	1.31	1.40
REGIONAL DEMAND QUANTITIES (BSF, 3/8-INCH)																
B.C. & ALBERTA STRUCTURAL PANEL DEMAND	0.65	0.68	0.73	0.79	0.82	0.81	0.82	0.87	0.86	0.83	0.87	0.90	0.88	0.84	0.82	0.88
Plywood	0.56	0.58	0.60	0.62	0.61	0.59	0.58	0.61	0.58	0.53	0.53	0.53	0.48	0.40	0.36	0.39
OSB/Waferboard	0.09	0.10	0.13	0.17	0.21	0.22	0.24	0.26	0.29	0.30	0.34	0.37	0.41	0.44	0.46	0.49
WESTERN U.S. STRUCTURAL PANEL DEMAND	5.98	6.71	6.91	6.75	6.55	5.93	6.67	6.99	6.91	6.50	7.13	7.43	7.26	6.94	7.39	7.83
Rough Plywood	4.52	4.96	4.84	4.55	4.41	3.95	4.42	4.56	4.45	4.10	4.43	4.50	4.05	3.79	4.06	4.40
Sanded Plywood	0.96	0.98	0.99	1.03	1.02	0.99	1.04	1.08	1.08	1.02	1.04	1.06	1.05	1.01	1.03	1.07
OSB/Waferboard	0.50	0.77	1.08	1.17	1.13	0.99	1.21	1.35	1.39	1.38	1.66	1.87	2.16	2.14	2.30	2.36
WESTERN U.S. IMPORTS OF CANADIAN OSB/WAFERBOARD	0.17	0.17	0.23	0.38	0.50	0.48	0.50	0.54	0.56	0.55	0.56	0.61	0.61	0.55	0.56	0.60

Source: RISI

Appendix Table 5

HIGH EXCHANGE RATE SCENARIO

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CANADIAN DEMAND QUANTITIES (BSF, 3/8-INCH)																
Domestic Demand for Structural Panels	2.51	2.74	2.91	2.99	2.96	2.96	2.99	3.19	3.22	3.16	3.34	3.46	3.53	3.32	3.50	3.70
Plywood	1.77	1.83	1.86	1.89	1.75	1.51	1.39	1.50	1.39	1.18	1.11	1.16	0.97	0.73	0.76	0.75
OSB/Waferboard	0.74	0.91	1.05	1.10	1.22	1.45	1.60	1.69	1.83	1.98	2.23	2.30	2.55	2.78	2.74	2.95
Export Demand for Structural Panels	1.31	1.27	1.43	1.57	1.58	1.41	1.42	1.51	1.49	1.34	1.27	1.35	1.23	1.02	1.13	1.09
Plywood	0.48	0.39	0.45	0.48	0.48	0.41	0.45	0.48	0.45	0.36	0.40	0.42	0.39	0.30	0.35	0.38
OSB/Waferboard	0.84	0.88	0.98	1.09	1.10	1.01	0.97	1.03	1.04	0.98	0.87	0.93	0.84	0.72	0.78	0.72
Total Demand for Canadian Structural Panels	3.82	4.01	4.34	4.56	4.54	4.37	4.40	4.70	4.71	4.50	4.62	4.81	4.76	4.54	4.63	4.79
Plywood	2.25	2.22	2.31	2.37	2.23	1.91	1.84	1.98	1.84	1.54	1.51	1.58	1.36	1.03	1.11	1.13
OSB/Waferboard	1.58	1.79	2.03	2.19	2.32	2.46	2.57	2.72	2.87	2.95	3.11	3.23	3.40	3.51	3.52	3.67
U. S. DEMAND QUANTITIES (BSF, 3/8-INCH)																
Total Demand for U.S. Structural Panels	23.68	26.58	26.99	27.03	25.60	23.14	25.75	27.44	26.94	25.20	27.79	29.17	28.36	26.92	28.35	30.24
Rough Plywood	16.62	18.32	17.74	17.06	14.90	12.23	12.83	13.63	12.77	11.05	11.35	11.96	10.60	9.22	9.65	9.97
Sanded Plywood	3.71	3.82	3.86	3.97	3.89	3.68	3.76	3.88	3.84	3.60	3.67	3.74	3.69	3.50	3.54	3.65
OSB/Waferboard	3.34	4.43	5.40	6.00	6.82	7.23	9.16	9.94	10.32	10.62	12.77	13.47	14.07	14.20	15.16	16.62
U.S. IMPORTS OF CANADIAN OSB/WAFERBOARD	0.84	0.87	0.96	1.06	1.06	0.96	0.89	0.97	0.96	0.87	0.74	0.82	0.70	0.55	0.59	0.56
REGIONAL DEMAND QUANTITIES (BSF, 3/8-INCH)																
B.C. & ALBERTA STRUCTURAL PANEL DEMAND	0.65	0.68	0.72	0.79	0.79	0.77	0.77	0.83	0.83	0.80	0.85	0.87	0.88	0.85	0.86	0.92
Plywood	0.56	0.58	0.60	0.61	0.57	0.50	0.46	0.50	0.47	0.40	0.41	0.39	0.34	0.27	0.27	0.32
OSB/Waferboard	0.09	0.10	0.13	0.18	0.22	0.26	0.31	0.33	0.36	0.40	0.44	0.48	0.54	0.58	0.58	0.60
WESTERN U.S. STRUCTURAL PANEL DEMAND	5.98	6.71	6.83	6.76	6.37	5.82	6.55	6.90	6.87	6.50	7.12	7.38	7.24	6.94	7.30	7.74
Rough Plywood	4.52	4.96	4.78	4.57	4.28	3.88	4.31	4.46	4.31	3.93	4.24	4.26	3.77	3.56	3.79	3.97
Sanded Plywood	0.96	0.98	0.99	1.02	1.00	0.97	1.00	1.04	1.05	1.00	1.02	1.04	1.04	1.00	1.02	1.05
OSB/Waferboard	0.50	0.77	1.05	1.17	1.08	0.97	1.23	1.40	1.51	1.57	1.86	2.08	2.43	2.38	2.49	2.71
WESTERN U.S. IMPORTS OF CANADIAN OSB/WAFERBOARD	0.17	0.17	0.23	0.34	0.40	0.36	0.34	0.38	0.39	0.36	0.32	0.36	0.31	0.25	0.26	0.25

Source: RISI

Appendix Table 6

Structural Board Demand - Judgemental Scenario
million sq. ft. 3/8"

	B.C./Alberta				Other Canada				Canada			
	Sanded	Sheathing	OSB	Total	Sanded	Sheathing	OSB	Total	Sanded	Sheathing	OSB	Total
1985	115	445	90	650	235	975	650	1,860	350	1,420	740	2,510
86	115	465	100	680	250	1,000	810	2,060	365	1,465	910	2,740
87	115	475	130	720	260	1,010	920	2,190	375	1,485	1,050	2,910
88	120	490	180	790	260	1,030	920	2,210	380	1,520	1,100	3,000
89	120	450	220	790	260	970	940	2,170	380	1,420	1,160	2,960
1990	120	390	260	770	260	960	970	2,190	380	1350	1,230	2,960
91	120	360	290	770	260	960	1,000	2,220	380	1,320	1,290	2,990
92	130	370	330	830	280	970	1,120	2,370	410	1,340	1,450	3,200
93	130	340	360	830	280	970	1,140	2,390	410	1,310	1,500	3,220
94	130	330	340	800	280	940	1,150	2,370	410	1,270	1,490	3,170
1995	130	330	390	850	300	960	1,230	2,490	430	1,290	1,620	3,340
96	130	320	420	870	310	980	1,290	2,580	440	1,300	1,710	3.450
97	135	310	445	890	310	990	1,360	2,660	445	1,300	1,805	3,550
98	130	290	430	850	310	980	1,370	2,660	440	1,270	1,800	3,510
99	130	290	440	860	310	960	1,380	2,650	440	1,250	1,820	3,510
2000	130	290	500	920	310	1,000	1,470	2,780	440	1,290	1,970	3,700

Appendix Table 7

Most Probable Scenario for B.C. PaneIboard Industries
million sq.ft. 3/8"

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
B.C. Alberta Demand																
- sanded/specialties	115	115	115	120	120	120	120	130	130	130	130	130	135	130	130	130
- sheathing	445	465	475	500	460	400	360	350	340	310	325	330	320	300	300	315
- OSB	90	100	130	170	210	250	290	350	360	360	395	410	425	420	430	475
- Total	630	680	720	790	790	770	770	830	830	800	850	870	880	850	860	920
Rest of Canada Demand																
- sanded/specialties	235	250	260	260	260	260	260	280	280	280	300	310	310	310	310	310
- sheathing	975	1,000	1,020	1,040	970	930	930	990	990	970	1,010	1,040	1,060	1,050	1,040	1,100
- OSB	650	810	910	910	940	1,000	1,030	1,100	1,120	1,120	1,180	1,230	1,290	1,300	1,300	1,370
- Total	1,860	2,060	2,190	2,210	2,170	2,190	2,220	2,370	2,390	2,370	2,490	2,580	2,660	2,660	2,650	2,780
Export from B.C./Alberta																
- sanded/specialties	60	50	55	60	65	55	65	70	70	65	70	75	70	65	70	75
- sheathing	410	340	395	420	435	375	435	450	450	385	430	465	430	405	450	485
- Total plywood	470	390	450	480	500	430	500	520	520	450	500	540	500	470	520	560
- OSB to U.S.	170	170	230	380	480	470	500	570	630	680	730	780	800	800	830	900
Total Demand on B.C./Alberta Panelboard Industry																
- sanded/specialties	410	415	430	440	445	435	445	480	480	475	500	515	515	505	510	515
- sheathing[1]	1,790	1,765	1,850	1,920	1,825	1,665	1,685	1,730	1,740	1,625	1,725	1,795	1,770	1,715	1,750	1,860
- Total Plywood	2,200	2,180	2,280	2,360	2,270	2,100	2,130	2,230	2,220	2,100	2,225	2,310	2,285	2,220	2,260	2,375
- OSB[2]	285	305	405	600	740	775	850	930	1,050	1,100	1,200	1,270	1,300	1,300	1,340	1,450

1 after excluding supply from other Canada
2 includes sales to other Canada (mainly Saskatchewan and Manitoba)